

# LESSON 4 We are all responsible Water Users!

## Lesson at a Glance

This lesson addresses the impact humans have on our water resources. It covers the necessity and methods for promoting water conservation and prevention of water pollution. Students engage in a hands-on activity to explore how easy it is to conserve water. Each student will observe their families' water conservation and pollution prevention efforts, and score their habits. Then using an informative online presentation by NOAA called, "Water Cycle and Global Impact," the teacher guides students into discussing the global importance of water, reinforcing the importance of understanding how the water cycle functions all over the globe, and how this knowledge can be used to conserve water and prevent water pollution.

## Lesson Duration

Two 45-minute periods

## Essential Question(s)

How can we conserve water resources and protect them from pollution?

## Key Concepts

- Humans have the power to prevent water pollution and to conserve water. There are many simple things we can do every day to be a responsible water user.

## Instructional Objectives

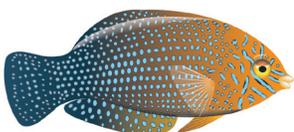
- I can write several paragraphs describing various ways to conserve water and to prevent water pollution.
- I can collect and analyze data to figure out how my family is wasting and polluting Hawai'i's water.
- I can pose a question and develop a hypothesis based on my observations during a water conservation experiment.

### Related HCPSIII Benchmark(s):

Science SC 3.1.1  
Pose a question and develop a hypothesis based on observations.

Science SC.3.1.2  
Safely collect and analyze data to answer a question.

Language Arts LA 3.5.3  
Group related ideas into paragraphs.



## Assessment Tools

### Benchmark Rubric:

<b>Topic</b>		<b>Scientific Inquiry</b>	
<b>Benchmark</b> <a href="#">SC.3.1.1</a>		Pose a question and develop a hypothesis based on observations	
<b>Rubric</b>			
<b>Advanced</b>	<b>Proficient</b>	<b>Partially Proficient</b>	<b>Novice</b>
Pose a question and develop a hypothesis based on logical inferences and observations	Pose a question and develop a hypothesis based on observations	Pose a question or develop a hypothesis partially based on observations	With assistance, pose a question or develop a hypothesis
<b>Topic</b>		<b>Scientific Inquiry</b>	
<b>Benchmark</b> <a href="#">SC.3.1.2</a>		Safely collect and analyze data to answer a question	
<b>Rubric</b>			
<b>Advanced</b>	<b>Proficient</b>	<b>Partially Proficient</b>	<b>Novice</b>
Summarize and share analysis of data collected safely to answer a question	Safely collect and analyze data to answer a question	With assistance, safely collect and analyze data	With assistance, safely collect data and attempt to analyze data
<b>Topic</b>		<b>Design</b>	
<b>Benchmark</b> <a href="#">LA.3.5.3</a>		Group related ideas into paragraphs	
<b>Rubric</b>			
<b>Advanced</b>	<b>Proficient</b>	<b>Partially Proficient</b>	<b>Novice</b>
Group related ideas into paragraphs to create a clear and logical organization that guides the reader	Group related ideas into paragraphs	Group some related ideas into paragraphs, but the relationship between other ideas may be superficial or unclear	Group very few related ideas into paragraphs

**Assessment/Evidence Pieces**

**Lesson**

- Index cards with pollution and conservation suggestions
- Index card with tooth brush experiment hypothesis and estimates
- *My Family’s Water Conversation and Pollution Prevention Score Card*
- Letters to the family about water conservation

**Materials Needed**

Teacher	Class	Group	Student
<ul style="list-style-type: none"> <li>• Method to project PowerPoint and video clip</li> <li>• Mud-filled, murky glass of water</li> <li>• One-gallon jug marked at ¼ gallon, ½ gallon, and 1-gallon intervals</li> <li>• Tooth brush in a Jar activity</li> <li>• 2 large jars to hold water (glass or see-through plastic)</li> <li>• 2 new tooth brushes and tooth paste</li> <li>• 2 paper cups</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• None</li> </ul>

**Instructional Resources**

Teacher Reading: *The Value of Water*

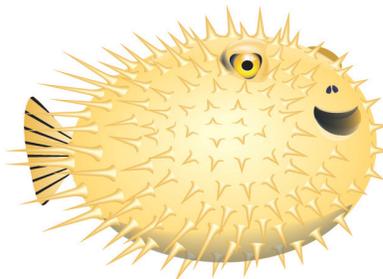
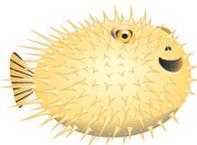
PowerPoint Presentation: *Human Impacts on the Ocean*

Student Worksheet: *My Family’s Water Conversation and Pollution Prevention Score Card*

(an alternative would be to use the Board of Water Supply’s “32 things you can do to save water”

<http://www.hbws.org/cssweb/display.cfm?sid=2064> )

Sample Certificate: *My Family is a Super Water Helper!*



## Student Vocabulary Words

**pollution prevention:** the act of preventing pollution from entering our environment.

**water conservation:** the act of saving water by using it responsibly.

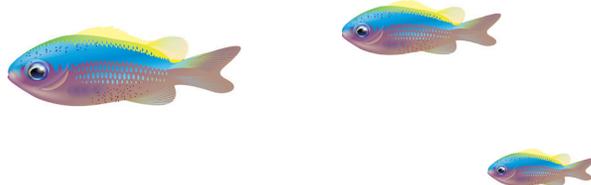
## Lesson Plan

### Lesson Preparation

- Review the Science Background provided in the Unit Overview and the Teacher Reading *The Value of Water*.
- Preview the PowerPoint *Human Impacts on the Ocean* and the “Water Cycle Global Impact Movie” at NOAA’s website: <http://www.learningdemo.com/noaa/> (select View Lesson 7 Water Cycle, then click on the ‘Global Impact’ tab). Familiarize yourself with the movie clip, identifying places to pause for class discussion. Arrange to project the Internet movie on a large screen in the classroom, or arrange student access to computers for viewing.
- Preview and make copies of Student Worksheet *My Family’s Water Conversation and Pollution Prevention Score Card*, one per student. (this is a multiple page document)
- Allot a space on the bulletin board to post student ideas on Pollution Prevention and Water Conservation.
- Post a copy of the *My Family is a Super Water Helper!* Certificate.

### I. Water Pollution

- Begin the lesson by showing students a murky glass of water. Ask students: “Would anyone like a sip? Why not?” Looking for students to comment that the water is polluted and unhealthy for drinking.
- Now ask students to think of ways that water in our streams, wetlands, and even off our beaches becomes polluted. If possible, refer to the water cycle diagram, reminding students that rainwater runoff flows from land into streams, then to the ocean. Prompt them to think of what kinds of pollutants rainwater could pick up as it runs off the land and flows to streams and the ocean. Create a list on the board of possible pollutants that could make their way into runoff water. (i.e., pesticides, oil from cars, soap from washing your car, cigarette butts etc.)
- Briefly discuss how polluted water could harm the environment, including plants, animals and us. Create another list next to the pollutants that shows the effects of the pollutants on plants, animals, humans. (Refer back to both of these in Section III Taking Care of Water.)
- Then log onto the National Oceanic and Atmospheric Administration’s website called, “*Water Cycle and Global Impact*,” available at <http://www.learningdemo.com/noaa/>. (Select View Lesson 7 – Water Cycle.) Select the tab labeled “lesson,” and then select the “Global Impact” tag to access a narrated movie clip on the water cycle. Either project the image onto a large screen, or arrange for students to gather around one or more computers.
- As students watch the movie, use the pause button and ask students to describe and interpret the images as well as the narration. Help them connect the movie to what they know in general about the water cycle and watersheds in Hawai‘i, and about specific local counterpart examples.



- F. Show PowerPoint *Human Impacts on the Ocean*. This one slide PowerPoint will show students the affects humans have had on the ocean water. Complete the discussion by drawing out from the students their ideas about why understanding the water cycle and preventing pollution are important for people as well as plants and animals on land and in the ocean worldwide.

## II. A Limited Water Supply

- A. Explain to students that especially during the hot dry season here in Hawai‘i, we sometimes don’t get much rain. Ask students to recall and describe what they have seen that is evidence that there had been little rain. They should be able to readily describe how plants turn yellow or brown. Some may connect this with field brush fires, and the need to use water to extinguish the flames.
- B. Follow this with questions that ask students to think about what people do during the hot dry season. Most likely they will talk about watering yards, but also remind them that people are also more likely to take showers (at the beach or home) to stay cool. Help students realize that people increase their water use during periods of hot dry weather. Briefly discuss what happens to our water supply when human water use increases, and rainfall decreases.

## III. Tooth Brushing in a Jar (Conservation Experiment)

- A. Provide each student with an index card and a pencil. Show students the jug with markings at the one-quarter gallon, one-half gallon, and one-gallon intervals. Explain to the class that they are going to participate in an experiment on brushing your teeth and water usage. Ask students, “How much water do you think you use when you brush your teeth if you leave the faucet running as you brush? How much water do you think you would use to brush your teeth if you shut the water off when you brush?” Have students estimate how much water they think they would use in each situation on the index card. Under their estimates have the students create a **hypothesis** for the question “Which method of brushing their teeth would be the most efficient use of water?”
- B. Begin the experiment. Choose a student volunteer to come to the sink and brush their teeth. Place the empty, marked jug under the water faucet, so that water coming from the faucet goes directly into the jug. Provide the volunteer with a new toothbrush, some toothpaste, and a cup to rinse. Tell the volunteer to brush his/her teeth just like he/she would at home for one minute. Instruct the student to lean into the sink while brushing (no spitting!) and to leave the water running while she/he is brushing. Allow the student to brush for at least one-minute, and then rinse his/her mouth (spit rinse into sink, not jug). When the volunteer has finished rinsing, hold up the jug, so that all students can see how much water filled the jug. Ask students to compare what is in the jug to their estimates.
- C. Next, empty the jug and select another volunteer. Inform students that this time, the volunteer will brush their teeth and turn the faucet off when he/she is brushing, and only turning it on when it comes time to rinse his/her mouth and toothbrush. Place the empty, marked jug under the water faucet, so that water coming from the faucet goes directly into the jug. Provide the volunteer with a new toothbrush, some toothpaste, and a cup to rinse. Ask the volunteer to brush his/her teeth just like he would at home for one minute. Remind the student to lean into the sink while brushing (no spitting!) and to turn off the water while she/he is brushing. Allow the student to brush for at least one-minute, and then rinse his/her mouth (spit rinse into sink, not jug). When the volunteer has finished rinsing, hold up the jug, so that all students can see how much water filled the jug. Ask students to compare what is in the jug with their estimates.



- D. Have the class look at their hypothesis and compare their estimates to the actual amounts of water used in each phase of the experiment. Which way of brushing teeth is the most efficient use of water? Ask students if they think they could use this simple water-saving technique at home. Have the class share other simple ways to save water around the house.

#### IV. Taking Care of Our Water

- A. Refer students back to the list of pollutants and the effects of those pollutants on plants, animals and humans created on the board. Remind them about the connection of pollutants and the water cycle here in Hawai‘i. Ask “What Should We Do to Conserve Water and Prevent Water Pollution?” Anticipate that you will need to prompt their thinking at two levels: 1) about their own individual responsibilities and actions, and 2) about larger societal actions (e.g., laws, public education).
- B. Give students three to five index cards. Ask students to list on each card one way they think they can conserve water or prevent water pollution.
- C. When they have completed their cards, post them on a bulletin board. Briefly discuss each idea as you post the cards. Sort the cards as you post them, with one set related to pollution, and the other related to conservation.
- D. After the discussion have students add any new vocabulary to the word wall for this lesson.



#### V. Family Water Conservation and Pollution Prevention

- A. Ask students: “Do you think you and your families are doing a good job of being responsible water users?” Explain to students that over the next week, they will have the chance to observe how well they and their family do at conserving water and preventing water pollution.
- B. Provide each student with the Student Worksheet, “*My Family’s Water Conversation and Pollution Prevention Score Card.*” Review the scorecards with students to make sure they understand how to use the cards. The card contains information and instructions on how students will observe and record their families’ water conservation and pollution prevention efforts.
- C. Inform students that they have seven days to complete the scorecards. At the end of seven days, have students tally the scores and inform students that if their family scored between 18 to 22 points, they will be awarded a *My Family is a Super Water Helper!* Certificate.
- D. Provide students with a blank, lined paper and a pencil, and instruct each student to write a letter to his/her family about how they can improve their water conservation and pollution prevention efforts. Ask each student to write a two- to four-paragraph letter that contains three or more ideas that a family can readily implement to become more responsible water users.
- E. Collect letter for assessment, and then encourage students to take the letter home to share with their family.

## Extended Activities

1. Read “The Lorax,” by Dr. Seuss, which is a tale about deforestation, and abuse of natural resources. Guide students through a discussion of how to relate the story to our own natural resources, the human impact on them, and the contents contained within the lesson for water conservation and pollution prevention. Ask students what can be done to save our precious resources. Next, in the writing style of Dr. Seuss, instruct students to write (journal) a short story or poem about water conservation and pollution prevention. Have students add a drawing that reflects their writing. Ask students to read their stories/poems aloud, and to display them at the Water Conference.
2. Engage students in online activities including a Water Fun Quiz, Coloring Pages, a Royal Flush game that will challenge their knowledge of water conservation at the Board of Water Supply’s website Kids’ Corner, <http://www.boardofwatersupply.com/cssweb/display.cfm?sid=1358>.
3. Integrate the following readings into this lesson, or add these books to your classroom library for the duration of the unit:
  - Armitage, K. (2005). *Akua Hawai‘i, Hawaiian Gods and Their Stories*. Honolulu, HI: Bishop Museum Press.
  - Seuss, T. (1971). *The Lorax*. New York, NY: Random House.



# LESSON 4 Teacher Reading

## The Value of Water

In a previous lesson, we discussed how ancient Hawaiians believed that the gods would always bless Earth with water so long as water was used with respect, and resources were well cared for. In this lesson, we will uncover ways we can show respect for water, and ways to truly care for this precious resource.

We use water every day for lots of things. For example, we brush our teeth, wash our dishes, and water our lawns. Sometimes though, we forget that water is a valuable resource. Only 0.65% of Earth's total water supply is neither salty nor frozen and is usable. And the quality of that vital water is at risk, because as it moves through the water cycle, it is exposed to a host of natural and man-made pollutants. As clouds drift above cities, and rivers run past factories and fields, their waters pick up industrial and agricultural wastes. As groundwater infiltrates through the soil, it gathers up mineral compounds and buried toxic chemicals.

This *pollution* can destroy our ecosystems, water quality, and our water supply. Pollution comes in the form of pesticides, herbicides, fertilizers, paint, oil, gas, cleaning solvents, and other contaminants. It can seep into the soil and reach our groundwater supply. Pollutants also enter streams, and oceans via sewer systems, killing stream and ocean life. Beaches in Hawai'i have been closed periodically due to pollution washed down from streams or overflowing sewer systems.

Human activities that modify our ecosystems can inadvertently interfere with the water cycle. For example, many industries release waste gases into the air, and when it rains, the gases are absorbed in the falling rain – and may even be recycled again through the water cycle. This polluted rain is called acid rain. An acid is a chemical that can harm living things. Since water is a universal solvent, many substances are dissolved by rain only to find their way in surface runoff and groundwater.

By paying attention to how we treat water, and by keeping it clean, we can prevent water pollution. Today, we finally are seeing people becoming more careful with the water they use. This is referred to as water *conservation* and pollution prevention. There are many laws that govern residences and businesses, and the way they dispose of toxins that may reach our water systems. For example, if your mom or dad has just finished painting the living room and they need to dump the excess paint, or if your local car mechanic needs to dispose of used oil, they must dispose of these toxins at a designated pollution collection agency. Homes and businesses may also be limited by the amount of water they use during droughts.

Even the ancient Hawaiians had formal rules that discouraged water waste. The chiefs were the trustees of water, and they exercised control over it. For example, they set up water use in the upland areas so that there would be enough water to be used by lowland communities. They also established strict schedules for clearing and diverting rivers and streams, so that not one family would have more water than needed. Farmers were expected to keep their fields free of weeds and clutter to keep communal streams clean.

There are lots of ways we can prevent water pollution and exercise water conservation at home. Our water supplies must be carefully managed, so that we can continue to provide people and wildlife with clean, pure water. After all, water is the source of life. We cannot live without it... *E Mālama I Ka Wai*, care for the fresh water.

# LESSON 4

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

## My Family's Water Conservation and Pollution Prevention Score Card

How much water does your family use a week? Do you think you try to conserve water? How about preventing water pollution? This scorecard will tell just how well you and your family do at being responsible water users.

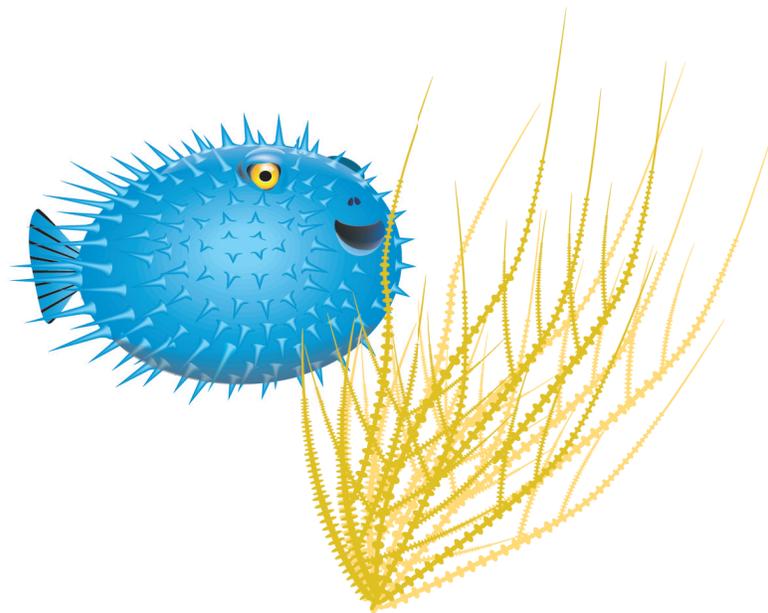
### Instructions:

Inform your family that over the next week you will observe their water usage habits. You will score them on how well they do at conserving water and preventing pollution. Before you begin, read them the list of water saving and water prevention pollution tips listed on this scorecard. You might even want to post these tips on the refrigerator to remind yourself and your family to be responsible water users. Give 1 point for each tip you and your family does. At the end of the week, you will add up all the points scored, and award your family a certificate if they score between 15 to 18 points. Good luck!

Water Saving Tips	POINTS	Water Pollution Prevent Tips	POINTS
Grow "unthirsty" plants (like succulents, cactus, etc.)		Reduce the use of chemical pesticides.	
Don't let tap water run! Have easy to get drinking water in refrigerator.		Recycle plastics, glass, paper whenever possible.	
Take short showers instead of baths.		Give old electronics equipment away, or recycle them (they contain lots of contaminants).	



Water Saving Tips	POINTS	Water Pollution Prevent Tips	POINTS
Use a low-water flow showerhead.		Use biodegradable soap to wash your car, and park the car on the lawn so that runoff goes into the soil, not drains.	
Turn off water while washing your face.		Don't dump anything into storm drains – we don't want it to reach our oceans.	
Turn off water while brushing teeth.		Dispose of car oil and oil-based paints by using kitty litter or an oil change box.	
Run a full load of laundry instead of a half load.		Use rechargeable batteries whenever you can, and recycle them when they are used up.	
Use a low-water flow washing machine.		Clean up after your pet. Animal wastes can be thrown in the trash, flushed down the toilet, or buried deeply.	
Use a low-water flow dishwasher.		Use biodegradable cleaning products to wash clothes, dishes, and anything else that needs cleaning.	
Don't let water run while washing the car.		Use natural products to fertilize your lawn and to keep bugs off your plants (contact the Hawai'i Department of Agriculture for more details - <a href="http://www.cdcg.org/pests.html">http://www.cdcg.org/pests.html</a> )	
Never use the toilet to flush away bugs.		Recycle old car tires and/or batteries.	
<b>Total Score</b>		<b>Total Score</b>	



My Family's Total Water Conservation and Pollution Prevention  
Score: \_\_\_\_\_

Find the appropriate option based on your score on the previous page, and then fill in the blanks accordingly.

We scored between **18** and **22** points! We are responsible water users! But, here are three ways we can improve:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_



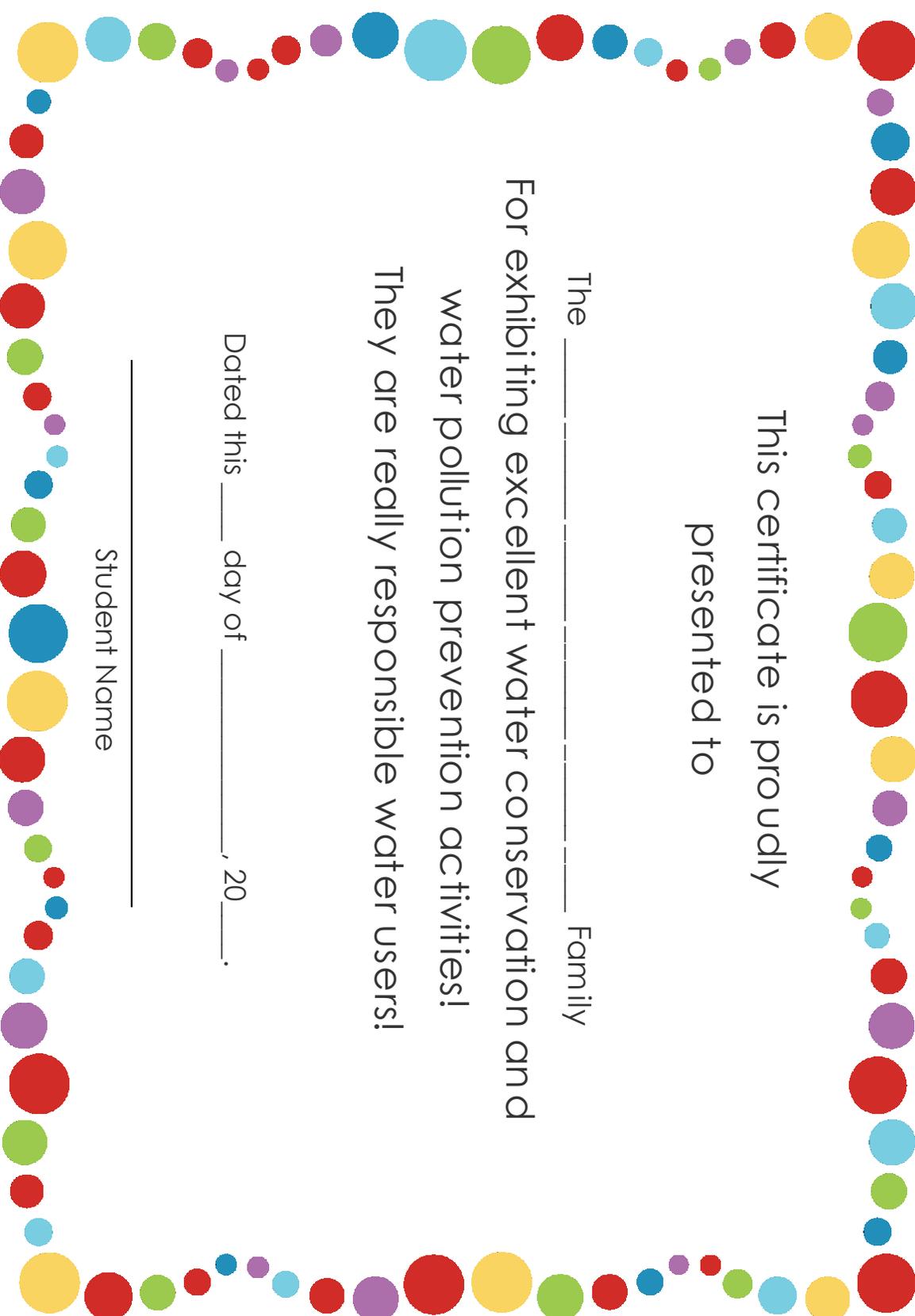
We scored between 13 and 17 points. So, we're on the road to becoming responsible water users. Here are three things we can work on:



1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

We scored less than 13 points. We have lots of room for improvement. Here are three things we can work on:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_



This certificate is proudly  
presented to

The \_\_\_\_\_ Family

For exhibiting excellent water conservation and  
water pollution prevention activities!  
They are really responsible water users!

Dated this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Student Name