

Water in Your Community

Overview

In this lesson, students will explore how safe water is made available to town residents via a local government's water authority. Teachers will then decide whether to focus on examining water conservation, or on pollution by plastic straws with students (or both). The conservation activity culminates with students designing water conservation stickers that will be placed around the local public library. The plastic straw pollution activity culminates with an activity where students plan a "Skip the Straws Day" at the public library and design a poster advertising the event.

Grades

3-5

Materials

- Gallon jug of water or attached gallon jug of water image
- Polluted River Image, attached
- Optional: City of Durham's, "Your Stormwater Dollars at Work" video, available here: <https://www.youtube.com/watch?v=Z3leS0gFH1M&feature=youtu.be>
- Water Treatment Cycle diagram, attached
- "How Much Water Did It Take" and "How Much Water Does My Family Use in a Day", handouts attached
- "Create-a-Conservation Sticker" handout, attached
- Plastic straw or attached image of plastic straw
- Straws documentary trailer. Available here: <http://www.strawsfilm.com>
- "Strawless Ocean Fact Sheet," attached
- "Skip the Straws Day Poster" handout, attached
- Art paper and supplies (for poster making)
- Optional (but recommended): a representative from the local water authority

Duration

20-90 minutes, depending on the amount of time spent on the optional activities

Teacher Preparation

This activity can be done in class or, preferably, during a trip to your local library. If teachers plan on completing this activity at the local library, contact the library staff several weeks before visiting and share this activity with them. Ask them to reserve books dealing with water treatment, water conservation, or water pollution.

If teachers plan on inviting a representative from the local water authority to talk to the class about their job and the role of water treatment in the community (highly recommended), teachers should contact the department several weeks in advance. Many water authorities have a public outreach official to assist with these types of requests, so we suggest contacting them first to check for availability and to see what educational materials or presentations they offer.

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Procedure

Where Does Water Come from and How Do I Use It?

1. As a warm-up, show students a gallon jug of water. If an actual jug isn't available, use the attached picture. Ask them to imagine different things the water might be used for (i.e. drinking, cooking, washing, watering, etc.) Facilitate discussion of all the different ways we use water and list them on the board or chart paper. Next, ask students to discuss why water is important. Encourage them to not only note why it is important to their individual survival, but also why it is important to the earth, trees, animals, etc.
2. Ask students to think for a few minutes about where water comes from then have them share their ideas with the class. (As an alternative, instruct students to draw a picture that shows where they think water comes from.) Again, chart student thoughts on the board or on chart paper. Ask students if they can identify the places they can get water in the library (water fountain, sink, etc.)
3. Give students some basic information on where water comes from (refer back to the answers they came up with when possible). Explain to students that the water they get from their faucet can come from two places - from the water in lakes or rivers (**surface water**), or from water that comes from wells (**groundwater**). Point out that people living in cities generally get their water from surface water, whereas people living in more rural areas often get their water from wells.
4. Show students pictures of a polluted water (such as those attached or have books with images on hand) and ask:
 - We just learned that those of us living in cities generally get our water from lakes and rivers. Would you want to drink water from this river? Why not? Would this water be safe to drink?
 - Think of all the things that can fall into a lake or a river. Water coming from the lakes and rivers can be dirty. It might have leaves, wood, bugs, or even dead animals in it! (*Explain that **pollution** is the introduction of harmful things into the environment.*) So why is the water that comes through our faucet clean and safe to drink?
5. Share the attached diagram of the water treatment cycle and discuss the questions below. (Teacher note: Steps 5, 6 & 7 will be most relevant if your student population is predominantly city based. If many of your students' homes instead use well water, give them an overview of the well system. See <http://www.groundwater.org/get-informed/basics/wells.html>)
 - Where is the water stored after it's treated? Do you know where the water storage tank(s) is/are in our town?
 - *Water storage tank*
 - If available, teachers may wish to share a picture of their town's water storage tank or visit the UNC Water Tower twitter account: <https://twitter.com/UNCWaterTower>
 - Where does the water go after it leaves your home? What is wastewater?
 - *To the wastewater treatment plant. Wastewater is any water affective by human use (flushing toilets, washing dishes, washing clothes, etc.)*
 - Where does the wastewater go after it's treated?
 - *It's released back into the environment.*
 - How does the water travel through the water treatment cycle?
 - *Pipes*

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6. Tell students that for those of them that live within city limits, the reason their parents pay a water and sewage bill to the city each month is to pay for these services. Ask students:
 - Why is it important that our city has a water treatment plant and sewage services?
 - How might our lives be different if our local government didn't work so hard to make sure our water is clean, or that our sewage/waste is removed from our homes and cleaned up?
7. If a representative from your local water and sewer authority is joining you, introduce this person and allow him/her to share additional information with students. Make sure to also provide time for students to engage with the representative in Q & A.
8. OPTIONAL: Show students the "Your Stormwater Dollars at Work" video from the City of Durham. Available here: <https://www.youtube.com/watch?v=Ak-js9MPSMU> Discuss the following questions after viewing the video:
 - What is stormwater?
 - What's runoff? What kind of problems can it cause?
 - *Runoff is water that's not absorbed into the ground. It can become polluted and travel into rivers and lakes. It can also increase erosion on the banks of creeks and streams.*
 - How does the City of Durham determine the stormwater utility fee?
 - *Charge you a fee based upon the amount of hard surface area on your property.*
 - What do those fees pay for or what services do the stormwater services team provide?
 - *Pipe maintenance, monitor pollutants, repairs, clean up polluted waterways, and street sweeping.*
 - What small changes can you make to ensure that your stormwater is as clean as possible?
 - *Pick up after your pets, use less fertilizer on your lawn, let plants grow near river and lake banks, and properly dispose of hazardous materials.*
9. Next, choose one (or more) of the below activities for further exploration.

Activity Option A: Conserving Water

10. Draw students' attention back to the gallon of water they discussed at the beginning of the lesson. Ask students to raise their hands and make some guesses regarding the following:
 - How much water does it take to brush your teeth? *(After they have guessed tell them if they leave the water running, it takes approximately two gallons of water.)*
 - Refer back to the various activities from the list students created in the warm up and have them estimate how much water each takes.

How Much Water Do We Typically Use?

11. Tell students that you want them to think about all the things they and their families do in a day that uses water. Pass out the attached handouts, "How Much Water Did It Take" and "How Much Water Does My Family Use in a Day". Go through each use of water noted on "How Much Water Did It Take" and the number of gallons used for each task. Then, direct student's attention to "How Much Water Does My Family Use in a Day". Explain to students that from the time they wake up until the time they go to sleep, you want them to track every time they and anyone in their household use water. The chart will tell them how many gallons an activity takes, and they should color in that many gallons on the handout given to them. Ensure students understand they should color in the gallons every time that activity takes place. For

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example, if every member of a family of three brushes their teeth in the morning, students would color in 6 gallons. If every member again brushes their teeth that night, students would color in 6 more gallons.

- **Teacher Note:** Students with larger families may require more than one copy of the “How Much Water...” worksheet. Also, ideally students would complete this tracking activity on a weekend or holiday, so that they may note water use from morning till night.
12. Next, ask students what it means to **waste** water. Ask students to comment on why wasting water is a bad thing to do. Then, introduce the term **drought**. Encourage students to share what they know about the word drought or to mention where they may have heard the word used. Explain to students that a drought is a period of long, dry weather. During a drought, little to no rainfall occurs, thus surface water and ground water gets lower and lower. If internet access is available, visit the NC Drought Management Advisory Council website: <http://www.ncdrought.org/>. Ask students to identify the areas (if any) that are currently experiencing a drought. Discuss:
- Name the things that need water to survive. (*plants, animals, humans*)
 - How do you think a drought affects our communities? Who might a drought be hardest on and why?
 - Is there anything we can do to help when we are experiencing a drought? (Tell students that while they do not have the power to make it rain, they can help the situation with the drought by making the choice to **conserve** water.)
 - What does it mean to **conserve**? (*to use wisely, to save*)
 - If each of us tried to use less water, how might that help the drought? Did your family use any water that they didn’t need? (*Discuss the difference in **want** and **need**, noting that we need water to drink and survive, but we don’t need to run the washing machine when it isn’t full.*)
 - Whose **responsibility** is it to manage our water supply and to encourage conservation? (*discuss the interaction between **local government** and **state government** as well as individual **citizen’s responsibility***)
 - What might the **consequences** be if we don’t change our behavior to waste less water?
13. Ask students to review their water tally sheet and to come up with ideas on ways they and their family members can cut down their water use (conserve). Remind them to consider the difference in want and need. (*Teachers may need to assist students with ideas, such as turning off the water while brushing teeth or washing dishes; taking shorter showers or turning off the water while lathering; waiting for full loads of laundry or dishes before using washers; plugging the sink when washing dishes; catching rain water in buckets to use for watering; etc.*) Highlight the positive impact of every family of a community conserving water.
14. As a final assignment, have students identify all the areas in the library (or school) where people use water. Then distribute the attached “Conservation Sticker” handout. Ask students to design a sticker on how to conserve water and/or the importance of conserving water in NC. Review the instructions and allow students to begin working.
15. Once students have completed their stickers, hang them in the appropriate areas around the library (or school).

Additional Conservation Activities

16. Discuss drought in further detail, going over the concept of water restrictions. Instruct students to imagine they are the Mayor of their town and to brainstorm ways they would convince their community to conserve water. Students can also brainstorm punishments for community members who do not follow water restrictions. Afterwards, go over any local water restrictions currently in place and existing penalties for not adhering to water restrictions.

Activity Option B: Skip the Straws Day

17. Show students a plastic straw (or the attached image of a plastic straw). Ask students the following questions:
- What is this? What is it used for?
 - How can you relate this straw to water?
 - What do you do with a straw after you're done using it?
 - Where do you think it goes after you throw it out?
 - Does it biodegrade or breakdown naturally?
18. Inform students that plastic straws are very harmful to the environment because they don't break down. After we throw them out, they sometimes end up in different bodies of water, where they cause problems for the animals that live there. If a projector with internet access is available, show students the two-and-a-half-minute trailer for the documentary, *Straws*: <http://www.strawsfilm.com>, which explores the impact of disposable plastic straws on our environment. (If a projector isn't available, skip to the step below.) If and after viewing the trailer, discuss the following questions:
- What material was used to make the first straws?
 - What are some reasons why straws are everywhere today?
 - *Fast food created the need to disposable plastic straws, the cost to manufacture plastic straws dropped, they can be more sanitary than reusable straws*
 - Why are straws and other plastics dangerous to animals? Can you imagine eating plastic? What do you think would happen to you?
 - What's the "No Straw Challenge?"
19. As a class, review the attached factsheet from [Strawless Ocean](#), an organization that seeks to educate people about the dangers posed by plastic straws. After reading the sheet, ask students:
- Besides not asking for one at restaurants, what else can we do to prevent plastic straws from getting in the ocean?
 - How might restaurants, coffee shops, etc. better serve people with disabilities without using disposable plastic straws?
 - *Provide reusable or paper straws*
20. After discussing the fact sheet, tell students that their local library and water authority have partnered together to host a "Skip the Straws Day" event. The purpose of this event is to educate people about where their water comes from and to help people understand why keeping their water free from plastic straws is important. Their job is to help plan activities for the event and to create a poster to publicize the event. Distribute the attached "Skip the Straws Day" handout and review it as a class. Teachers can decide whether students should work individually, in pairs, or in groups before starting the activity.

- **Teacher Note:** If you were unable to show the trailer for the *Straws* documentary, share the following information about the documentary with students. They will need to know this information because one of the activities listed on “Skip the Straws Day” event handout is a screening of the documentary:

“STRAWS is a documentary film that charts the history of straws and continues to present day issues that surround our current culture's obsession of single use conveniences. Used once and tossed, billions of non-recyclable plastic straws are used annually winding up in landfills, littering streets and finding their way to oceans. The Ocean Conservancy ranks straws as the number five most popular collected item at beach cleanups behind bottle caps, wrappers, and cigarette butts. A viral video of a sea turtle with a plastic straw in its nose has now sparked anti-plastic straw campaigns globally and inspiring sustainable alternatives. Actor/Director Tim Robbins narrates a humorous history of straws, and Director Linda Booker interviews marine researchers, artists, citizen activists, and business owners in California, Costa Rica and North Carolina about how it's possible to make a sea of change, one straw at a time.” ([Source](#))

21. After the students have completed their posters, instruct them to hang them around the room. Ask half the class to stand next to their posters and ask the other half of the class to complete a gallery walk of the posters. Encourage students to ask questions about their classmates' posters. Once students have completed the walk, ask students to switch roles.
22. Once all students have completed the gallery walk, discuss the following question to debrief:
 - Which of these stickers/posters do you think is the most effective? Why?
 - Can you describe the water cycle?
 - Why is it important to protect our water supply?
 - What are some ways that we can protect our water supply? Is conserving water enough? What else can we do at school or in home to help protect our water?
 - How can a little thing like refusing to use straws at a restaurant have a big impact?
 - Is personally working to protect our water enough? How can we can others involved or make them aware of the importance of clean water?
 - Besides providing free books for people to check out, how does a public library serve your community?
 - How can you work with your library to educate people about where their water comes from and why it's important?
23. If the library/school administration approves, teachers should ask students to hang their stickers or posters around the school or library to raise awareness about the importance of water conservation or the impact of plastic drinking straws on the environment.



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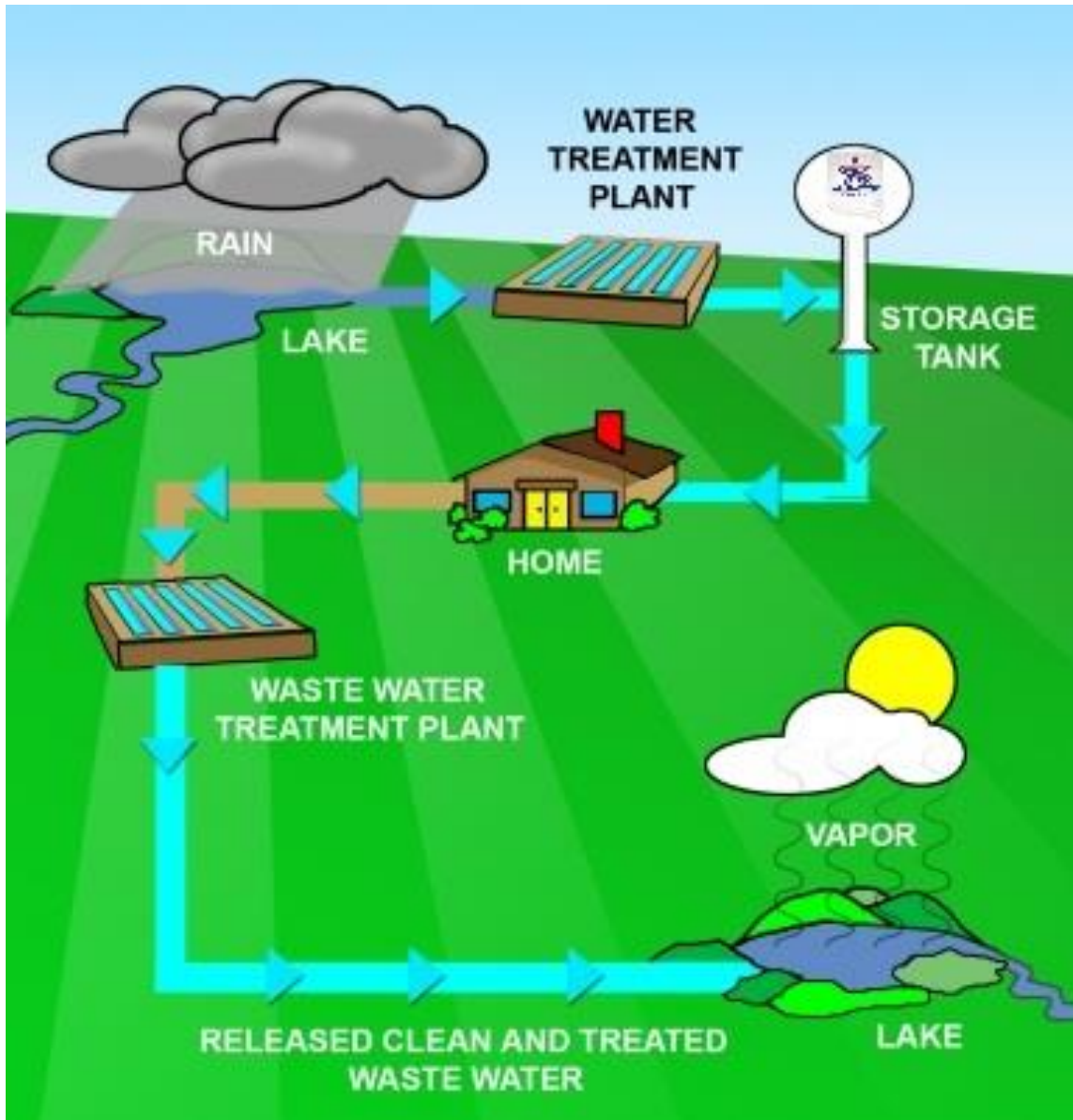
Sample Polluted Water Image



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Water Treatment Cycle

















































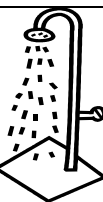













































































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Source: <http://www.arlington-tx.gov/water/services/treatment/>

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How Many Gallons of Water Did It Take?

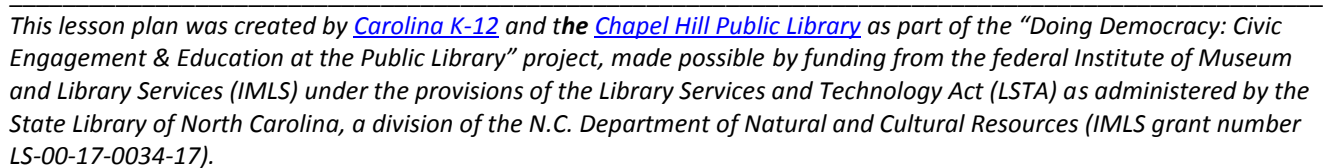
 Flushed toilet	  	3
 Turned on faucet- 1 min.	   	4
Filled the bathtub 	                                     	36
 Took a shower (5 minutes)	          	10
 Washed dishes by hand (water running)	                          	27
 Ran dishwasher	     	6
 Washed a small load of clothes	                         	25
Brushed teeth (water running)	 	2
Washed hands 		1

Source: <https://water.usgs.gov/edu/qa-home-percapita.html>

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A black and white line drawing of a faucet with a single drop of water falling from it. The faucet has a cross-shaped handle and a circular backplate. The drawing is simple and stylized, with hatching for shading.

Directions: Use “How Many Gallons Did It Take” to color in the appropriate number of gallons you or your family member used each time the water at home was turned on.



Create-a-Conservation Sticker

Directions: Your local library and water authority are teaming up to educate people about the importance of conserving water. Your job is to create a sticker that will educate and/or encourage people to use water wisely. These stickers will be placed around the library in areas where people use water (water fountain, kitchen, bathroom, flower gardens, etc.)

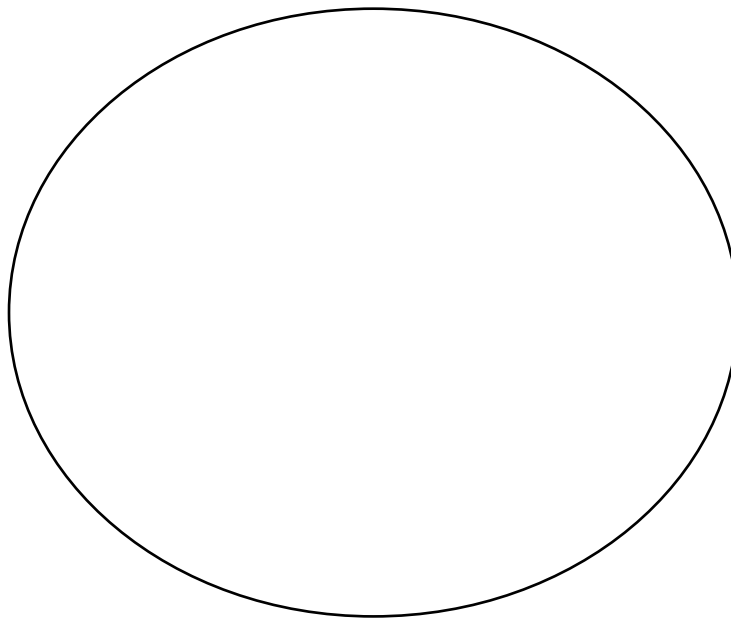
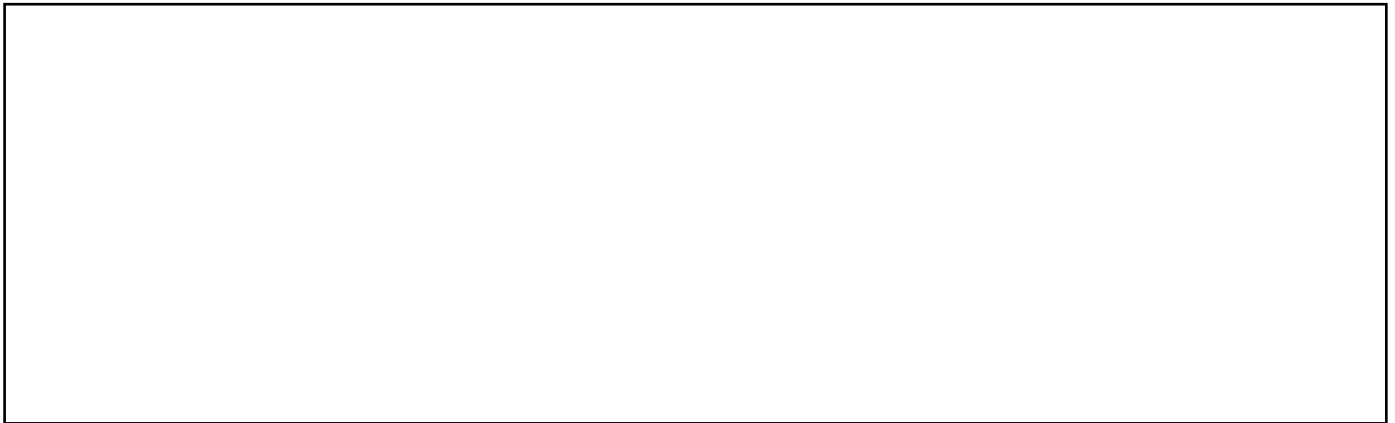
Start by answering the following questions, using the materials and information provided by your teacher/librarian/local water authority:

- Why is water important?
- Why should we conserve water?
- What are some ways that we can conserve water?

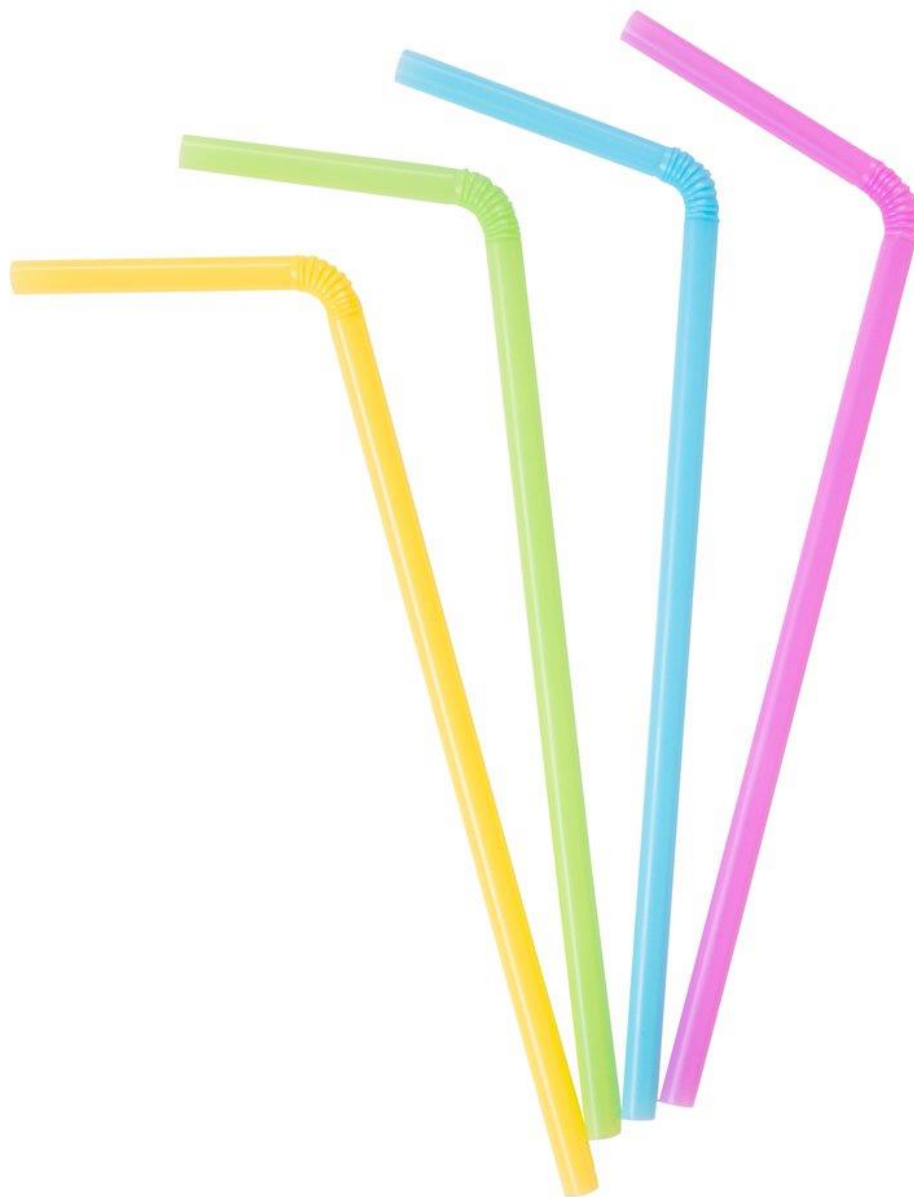


Next, choose one way to conserve water and create a slogan that relates to that idea. Use the image above as an example (*"Please Use Wisely. Every Drop Counts"*).

Finally, choose one of the following shapes below and design your sticker. Your design can be as simple as the example above or something more creative. Be sure to include your slogan and to make it colorful and eye catching. Remember, you want people to notice it!



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Strawless Ocean Fact Sheet

WHAT IS THIS ALL ABOUT? Plastic straws are really bad for the ocean. We use over 500 million every day in America, and most of those end up in our oceans, polluting the water and killing marine life. We want to encourage people to stop using plastic straws for good. If we don't act now, by the year 2050 there will be more plastic in the ocean than fish.



AREN'T PLASTIC STRAWS RECYCLABLE? Most plastic straws are too lightweight to make it through the mechanical recycling sorter. They drop through sorting screens and mix with other materials and are too small to separate, contaminating recycling loads or getting disposed as garbage.

HOW DO PLASTIC STRAWS GET INTO THE OCEAN? Plastic straws end up in the ocean primarily through human error, often 1) left on beaches in coastal communities and seaside resorts globally 2) littered OR 3) blown out of trash cans (oftentimes overfilled) or transport boats and vehicles.

While some city's waste management infrastructure is sound (like Seattle, for instance), not all communities have the same level of accountability. Remember, **all** gutters and storm drains lead to our ocean!

WHAT HAPPENS ONCE THEY'RE IN THE WATER? An estimated 71% of seabirds and 30% of turtles have been found with plastics in their stomachs. When they ingest plastic, marine life has a 50% mortality rate. What would our oceans be without marine life? What's equally as bad, perhaps even worse is that when plastic does make it into the ocean it breaks down into smaller and smaller pieces known as "microplastics" rather than biodegrading or dissolving, which poses great threats to marine life including fish.

WHAT IF PEOPLE NEED TO USE A STRAW, ARE THERE ALTERNATIVES? Yes, some people need a straw! Anyone who has had a stroke, has autism, MS or other life changing physical issue needs a straw and often a compostable plastic straw works best. We have those available, if in need. Currently we're undergoing straw tests with our friends in the disability community to see which straws may be the best for individuals with physical challenges that require the use of straws and likely in some cases the use of plastic straws to fulfill the basic requirement of drinking liquids.

WHAT ABOUT COMPOSTABLE PLASTIC STRAWS? While compostable plastic straws are good in theory, they can be disposed of incorrectly by individuals when there is a lack of information on public composting depositories. Compostable plastic straws are no better than regular plastic straws when they get into the marine environment. They are designed to break down in compost facility conditions, not sea water. That is why we support the switch to paper straws, not compostable plastic straws.

WHY FOCUS ON PLASTIC STRAWS? We already know that plastic bags and soda can rings are bad for the environment and end up in the ocean. Few people realize that straws are among the top 10 items found during beach clean ups and can do so much harm to seabirds, turtles and other marine creatures.

As an item of convenience for the vast majority of us, we believe refusing the single-use plastic straw is the easiest and simplest way for everyone to take action today to address plastic pollution. If we all take the pledge to refuse single-use plastic straws we will see a significant decrease in the number of straws found during coastal cleanups.

HOW CAN I GET INVOLVED? One simple way to help, is to say "**NO PLASTIC STRAW, PLEASE!**" the next time you go to a restaurant. Get in the habit of asking for no straw before you even order a beverage. And be ready to tell your server why.

Edited by Carolina K-12 for length and content from the following source: <https://www.strawlessocean.org/faq/>

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Skip the Straws Day Poster

Directions: Your local library and water authority have partnered to host a “Skip the Straws Day” event. The purpose of this event is to educate people about where their water comes from and to help people understand why keeping their water free from plastic straws is important. Your job is to help plan the event and create a poster to let your community know about the event.

A screening of the documentary *Straws* is already planned. Use the back of this handout or a separate piece of paper, brainstorm other activities for “Skip the Straws Day.”

After you brainstorm events, create your poster using materials provided by your teacher. Your poster must contain the following elements:

- A logo for “Skip the Straws” day.
- The time, date, and location of the event. (“Skip the Straws Day” always takes place on the fourth Friday of February.)
- One fact about where our water comes from
- Two facts about the impact of disposable plastic straws on our environment
- List four activities (three you brainstormed above and the screening of *Straws*)

Be prepared to share your posters with your fellow classmates.

Poster Due Date: _____



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