



Clean and Conserve

Water Science Project Guide



Clean and Conserve Education Program



ECOLAB®

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Introduction for Students

Are you ready to make a difference in your school and community? This Clean and Conserve: Water Science Project Guide will serve as your guide to understanding water use in your school, exploring strategies to use water more efficiently and investigating ways to make your school a healthier place for you, your classmates and your teachers.

Part one, School Water Audit, focuses on saving, or conserving, water. To understand water conservation, we must understand water. All living things, wherever they live on earth, need water to survive and flourish. Water is life!

Did you know that during the twentieth century, the world population tripled, while water use for human purposes multiplied sixfold? We can all examine how much water we use—and how we may be able to use less. The idea of conserving water and still meeting your water needs may seem simple, but, in reality, it can be challenging and com-

plicated. Using less water to satisfy the needs of an individual, a family, a school, an industrial plant, a city or a watershed requires thought, planning and, ultimately, action. It may necessitate a new way of thinking.

Water also plays a key role in the spread of disease—and preventing the spread of disease. Part two, Break the Chains, stresses the importance of hand washing and cleaning surfaces to protect yourself and others from infectious diseases—specifically those caused by bacteria and viruses.

Pathogens can infect us through the surfaces we touch every day—from the door at school to a pencil borrowed from a friend—as well as the food we eat, the water we drink and the water we use to clean and prepare our food.

You will have the opportunity to research bacteria and viruses that may impact your school—and learn how you can prevent them from spreading. The actions of one

person can have a dramatic effect on the health of a group. It takes people working together to break the chains of disease transmission.

Through these activities, you and your classmates will become detectives, auditors and epidemiologists. You'll examine current practices related to efficient water use and disease prevention, research potential issues, present your ideas for solutions and apply your knowledge to put them to use.

Small, local changes can make a big difference!

And that's what being a WaterStar is all about: contributing to a positive water future by learning about water and taking local action. Be a WaterStar and take action in your school and community. Visit www.projectwet.org/waterstar and tell us what you accomplished.



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Information for Teachers



Additional educator resources for helping students perform school water audits:

http://arizonawet.arizona.edu/programs/school_water_audit

<http://arizonawet.arizona.edu/programs/wsi>

Standards

NGSS

Middle School

MS-ESS3-3
MS-ETS1-1
MS-ETS1-3
MS-ESTI-2
Other DCI: ETS1.B, ESS3.A

High School

HS-EST1-3
HS-ESS3-4
HS-ESS3-6
HS-ESS3-3
HS-LS2-7
HS-EST1-2
HS-ESS3-2

Common Core, ELA

Middle School

CCSS.ELA-LITERACY.WHST.6-8.1; 2; 4; 7
CCSS.ELA-LITERACY.RST.6-8.3; 4; 7; 10
CCSS.ELA-LITERACY.RI.6 (7 AND 8).4; 10
CCSS.ELA-LITERACY.W.6 (7 AND 8).1; 2; 4; 9.B
CCSS.ELA-LITERACY.SL.6.1; 2; 3; 4; 5; 6
CCSS.ELA-LITERACY.SL.7 (AND 8).1; 3; 4; 5; 6
CCSS.ELA-LITERACY.L.6 (7 AND 8).1; 2; 3; 4; 5; 6

High School 9-10

CCSS.ELA-LITERACY.WHST.9-10.1; 2; 4; 7
CCSS.ELA-LITERACY.RST.9-10.1; 2; 3; 4; 7; 10
CCSS.ELA-LITERACY.RI.9-10.4; 10
CCSS.ELA-LITERACY.W.9-10.1; 2; 4; 7; 9B
CCSS.ELA-LITERACY.SL.9-10.1; 2; 3; 4; 5; 6
CCSS.ELA-LITERACY.L.9-10.1; 2; 3; 4; 5; 6

High School 11-12

CCSS.ELA-LITERACY.WHST.11-12.1; 2; 4; 7
CCSS.ELA-LITERACY.RST.11-12.2; 3; 4; 7; 9; 10
CCSS.ELA-LITERACY.RI.11-12.4; 10
CCSS.ELA-LITERACY.W.11-12.1; 2; 4; 7; 9B
CCSS.ELA-LITERACY.SL.11-12.1; 2; 3; 4; 5; 6
CCSS.ELA-LITERACY.L.11-12.1; 2; 3; 4; 5; 6

Common Core, Math

Mathematical Practices:

Make sense of problems and persevere in solving them.
Reason abstractly and quantitatively.
Construct viable arguments and critique the reasoning of others.
Model with mathematics.
Use appropriate tools strategically.
Attend to precision.

Standards

NGSS

Middle School

MS-ETS1-1
MS-ESTI-2

High School

HS-EST1-3
HS-EST1-2
Other DCI: PS2.B

Common Core, ELA

Middle School

CCSS.ELA-LITERACY.WHST.6-8.1; 2; 4; 7
CCSS.ELA-LITERACY.RST.6-8.3; 4; 7; 10
CCSS.ELA-LITERACY.RI.6 (7 AND 8).4; 10
CCSS.ELA-LITERACY.W.6 (7 AND 8).1; 2; 4; 9.B
CCSS.ELA-LITERACY.SL.6.1; 2; 3; 4; 5; 6
CCSS.ELA-LITERACY.SL.7 (AND 8).1; 3; 4; 5; 6
CCSS.ELA-LITERACY.L.6 (7 AND 8).1; 2; 3; 4; 5; 6

High School 9-10

CCSS.ELA-LITERACY.WHST.9-10.1; 2; 4; 7
CCSS.ELA-LITERACY.RST.9-10.1; 2; 3; 4; 7; 10
CCSS.ELA-LITERACY.RI.9-10.4; 10
CCSS.ELA-LITERACY.W.9-10.1; 2; 4; 7; 9B
CCSS.ELA-LITERACY.SL.9-10.1; 2; 3; 4; 5; 6
CCSS.ELA-LITERACY.L.9-10.1; 2; 3; 4; 5; 6

Common Core, Math

Mathematical Practices:

Make sense of problems and persevere in solving them.
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Photo: ©nicolas_iStock

The activities in *Clean and Conserve: Water Science Project Guide* are written for middle school and high school students. They are designed to be extended projects in which students are responsible for data collection, research, planning and collaboration over weeks or months. Throughout each activity, students are encouraged to interact regularly with their teachers. Teachers should read the activities in their entirety before students begin, to offer guidance as necessary.

“School Water Audit” Activity

Subject Areas

environmental science, geography, government, health, math

Student Objectives

- Read about water resources and water conservation.
- Work collaboratively with other students to conduct a water audit. Determine how much—and in what ways—water is used at school both before and after the implementation of water conservation practices.
- Conduct in-depth research on water efficiency for specific school fixtures and appliances.

Vocabulary

aquifer; audit, desalination, diversion project, drought, flow rate, ground water, hundred cubic feet (CCF or HCF units), infrastructure, opinion, potable, privately supplied water, publicly supplied water, recharged, source, surface water, wastewater treatment plant, water meter, water treatment plant, water-use efficiency audit

“Break the Chains” Activity

Subject Areas

environmental science, geography, health, life science

Student Objectives

- Discuss, debate and present a water efficiency plan for your school, recommending water conservation practices and recording their benefits.
- If a school water efficiency plan is implemented, continue ongoing data collection to provide evidence of water conservation.
- Present (to classmates) research about infectious diseases and how to prevent them.
- Collaborate with peers to produce a list of best practices to prevent common bacterial and viral diseases in your school.
- Start a campaign to encourage all students to implement best practices for disease prevention at school.

- Make a personal commitment to one or more of the best practices.

Vocabulary

airborne, bacteria, contagious, direct contact, disinfecting, dormant, epidemiologist, eradicate, foodborne, hard surfaces, hydrophilic, hydrophobic, immunity, influenza, indirect contact, infectious disease, pathogen, salmonella, soft surfaces, virus, waterborne



Photo: ©michaeljung/Shutterstock



WaterStar

The WaterStar recognition program encourages students and educators to contribute to a positive water future by learning about water and taking appropriate local action. For information on how you, your students and your school can be WaterStars, visit www.projectwet.org/waterstar.

To download this and other publications, and for information on online trainings, visit www.projectwet.org/cleanandconserve.



Introduction

Imagine your school was challenged to use 10, 15 or 25 percent less water. How would you and your school accomplish this goal? Who would be involved? What are the most effective ways to conserve water today? How much would your plan cost, and how much water would it save? How will you get your school to support your plan?

Around the world, drought, increasing demand for water and worries about water scarcity are causing communities to use less water.

This "School Water Audit" activity will help you understand water-use efficiency in your school and apply the data collected to develop a plan of action for class and school awareness, discussion and potential implementation.

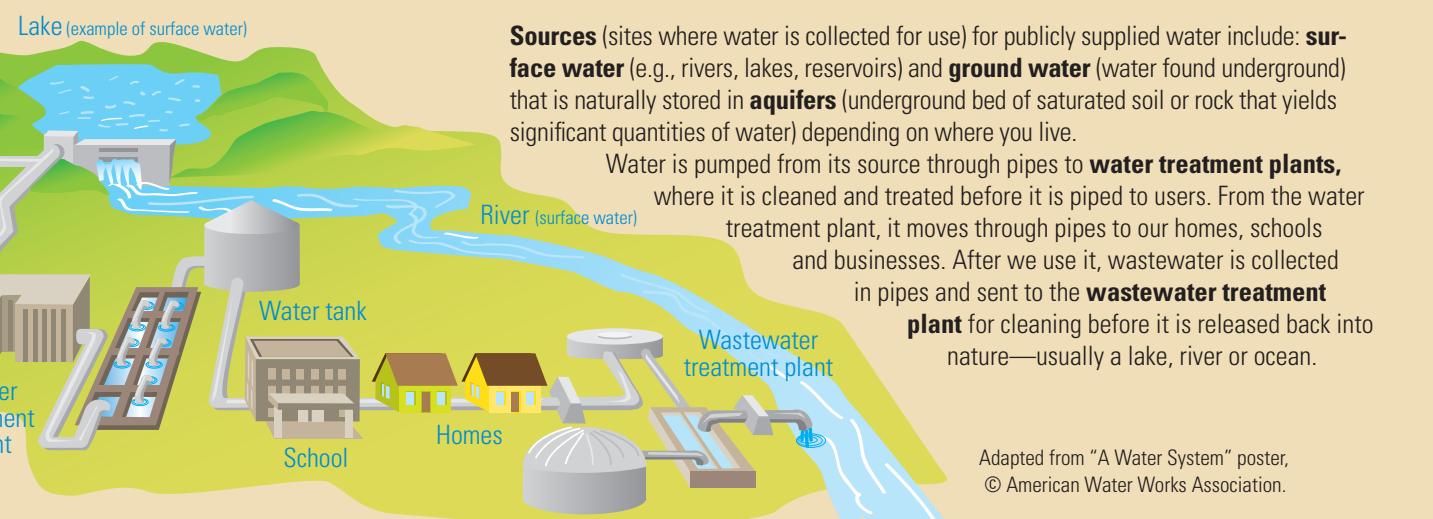
Where Does Your School's Water Come From?

We're accustomed to water coming out of our faucets every time we turn them on, but how does it get there?

Water delivered to many homes or school by a public agency—such as a city or county water department, water district, or utility district—is called

publicly supplied water. About 86 percent of the U.S. population receives water from public suppliers (source: USGS circular 1405). In this scenario, a government entity or private company withdraws water from a local water source (e.g., lake, river, reservoir).

Privately supplied water, often pumped from a private well, is water that is delivered to a single household or only a few consumers.



Water Costs

Infrastructure is the water and wastewater treatment plants, water-quality monitoring equipment, water storage tanks, pipes and all the people employed to supply the water.

And infrastructure costs money. These costs are charged to the water users or customers to pay for the water systems. Customers receive a monthly bill, usually based on the amount of water they use in a month. A device called a **water meter** connected to the water pipes records water use in **hundred cubic feet (CCF or HCF)** units. Some municipalities do not meter water and instead charge a single fee per month.

Why Conserve Water?

Even though many water sources are **recharged** (renewed) annually by rain or snow, water shortages can still occur. A water shortage could be caused by **drought** (extended period of below-average precipitation) or when the demand for water exceeds the supply. This might happen when there is a population increase in an area. Conserving water keeps more water available for all users.

Municipal water treatment plants are capable of treating a certain volume of water; if the population increases, say, 10 percent per year, the system may not be able to meet the growing water needs.



Conservation reduces the amount of water requiring treatment and can prolong the amount of time a treatment system is able to meet water needs before expansion is needed.

Technological

improvements, such as larger treatment plants, dams, **diversion projects** (altering the course of natural water flow) or **desalination** plants (removal of salt from water or seawater to make it drinkable) have helped solve some water supply problems. However, these options can take years to get approved and to plan, fund and construct—and may cause environmental issues in some locations.

Some communities simply cannot afford technological upgrades. If improvements are not an option, communities can instead implement methods such as water-use restrictions, increased water fees and public education about water conservation.

Because treated water has costs, conserving water can also lead to saving money—at home, at school and in your community.

Using Water Wisely

Conserving water means using it in the most efficient way possible. How can you use water more efficiently at school or at home?

Water aerator (Photo: ©manfredy/iStock) maximum **flow rates** (the speed water moves through pipes). Replacing older, inefficient fixtures can conserve water. Examples of technological changes include: replacing older toilets with more efficient models and installing aerators in faucets or high-efficiency showerheads.

3. Repairs. Leaking fixtures can waste a lot of water. Repairing leaks is often an easy way to conserve water.

There are many resources available online and in your community, including your city water department, for information about general water-use efficiency and water conservation. Here are a few to get you started:

Water-use efficiency:
www.nesc.wvu.edu/pdf/ww/publications/eti/watereff_tech.pdf

Ways to conserve water:
www.epa.gov/greenhomes/ConserveWater.htm

Water conservation tips for schools:
www.epa.gov/region1/eco/drinkwater/water_conservation_schools.html
www.swfwmd.state.fl.us/conservation/waterwork/checklist-school.html

Ways to Conserve Water

School Water Audit

Fixture, Appliance, System	Water Usage and Conservation Resources	Behavioral Changes	Technological Changes	Repairs
Dishwasher	<ul style="list-style-type: none"> Water-saving tips for dishwashing: www.home-water-works.org/indoor-use/dishwasher Dishwasher versus hand washing: www.nrdc.org/living/stuff/great-dishwasher-debate.asp 	<ul style="list-style-type: none"> Wash only when load is full. 	<ul style="list-style-type: none"> Use high-efficiency dishwasher: www.energystar.gov/products/certified-products/detail/dishwashers 	Repair leaks.
Drinking Fountain		<ul style="list-style-type: none"> Use a cup/bottle instead of letting water run down the drain. 		Repair leaks.
Faucet (kitchen, bathroom, utility sink)	<ul style="list-style-type: none"> How to fix a leaky faucet (video): www.home-water-works.org/indoor-use/faucet 	<ul style="list-style-type: none"> Don't run water while washing the dishes. Scrape food from dishes instead of rinsing. 	<ul style="list-style-type: none"> Replace with water-saving faucet: www.epa.gov/watersense/products/bathroom_sink_faucets.html 	Repair leaks.
Irrigation	<ul style="list-style-type: none"> Water-efficient landscaping: www.epa.gov/greenhomes/ConserveWater.htm#landscaping Water-efficient outdoor practices: www.epa.gov/greenhomes/ConserveWater.htm#maintenance Efficient watering brochure: www.epa.gov/watersense/docs/ws_watering508.pdf Your Yard Can Be Greener brochure: www.epa.gov/watersense/docs/ws_grassgreener508.pdf How to measure sprinkler water use: http://wateruseitwisely.com/100-ways-to-conserve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/#lawn 	<ul style="list-style-type: none"> Don't water grass when it's raining. Water during coolest part of day (early morning). Avoid watering on windy days. Water plants by hand. Water only when necessary to avoid overwatering (excess runoff). Make sure sprinklers aren't watering the pavement instead of the grass. Use alternate water source (rainwater, gray water). Raise lawn mower blade height (two to three inches). Plant rain gardens (to take advantage of runoff). What is a rain garden? Visit: www.raingardennetwork.com Add mulch to gardens and around shrubs and trees (less water evaporates). Water no more than one inch per week (place cans in the yard to see how long it takes to collect an inch of water). 	<ul style="list-style-type: none"> Install aerator (video): www.home-water-works.org/indoor-use/do-it-yourself#aerator Use automatic shut-off devices. Water-saving technologies: www.epa.gov/watersense/outdoor/tech.html Landscape with plants that require less water. Install an efficient irrigation system (e.g., drip lines). Use a nozzle with an automatic shutoff. Use moisture sensors. Install rain barrels (if legal in your state). Explore rebates available for upgrading technology or other water-saving measures (such as rain barrels). 	Repair leaks.

Fixture, Appliance, System	Water Usage and Conservation Resources	Behavioral Changes	Technological Changes	Repairs
Pool		<ul style="list-style-type: none"> Cover pool when not in use. 	<ul style="list-style-type: none"> Install a water-saving swimming pool filter. 	
Shower		<ul style="list-style-type: none"> Take shorter showers. Turn off the water while lathering with soap and shampoo, then rinse. 	<ul style="list-style-type: none"> Use high-efficiency showerheads: www.epa.gov/watersense/products/showerheads.html 	Repair leaks.
Toilet	<ul style="list-style-type: none"> Flush-volume for different toilets: www.conserveh2o.org/toilet-water-use Simple dye test for toilet leaks: www.home-water-works.org/indoor-use/do-it-yourself#tt-leak 		<ul style="list-style-type: none"> Retrofit a toilet with a tank bag or fill cycle diverter: www.conserveh2o.org/retrofitting-older-toilet#/retrofittoilet Install a dual-flush converter. Use new Watersense toilets: www.epa.gov/watersense/products/toilets.html 	Repair leaks.
Urinal			<ul style="list-style-type: none"> Change flush settings to water-saving mode on programmable automatic flush urinals. Install water-saving urinals: www.epa.gov/watersense/products/urinals.html 	Repair leaks.

In this activity, you will work with other students to conduct a water audit—and find ways to use less water at school.

Daily indoor water use per person in the United States is 69.3 gallons.		
Use	Gallons	Percentage of Total Daily Use
Showers	11.6	16.8%
Clothes washers	15.0	21.7%
Dishwashers	1.0	1.4%
Toilets	18.5	26.7%
Baths	1.2	1.7%
Leaks	9.5	13.7%
Faucets	10.9	15.7%
Other domestic uses	1.6	2.3%
TOTAL	69.3	100%

Source: Handbook of Water Use and Conservation, 2001



Photo: ©Arizona Project WET

ACTIVITY

School Water Audit and Water-Use Efficiency Report

Before you can take steps to use less water at school, you need a reference point from which to start and a way to measure progress. A School Water Audit can provide this information.

You will need:

- Full permission from school administrators
- A teacher for guidance
- **Team Worksheets** (p. 15 – 18, one copy per group)
- **Water-Use Inventory Sheet** (p. 19, at least one per group)
- Clipboards (optional)
- Paper
- Pen/pencil
- Calculator
- Stopwatch/timer
- Containers to collect water (buckets or bowls)
- Measuring cups or graduated cylinders to measure volume
- Access to research materials (Internet, library)
- **Water-Use Efficiency Report: FOCUS AREA** (p. 20, one per group)
- **Water-Use Efficiency Report: SCHOOL** (p. 21, one copy)

Getting Started

- a. Divide the class into several teams, as listed below.** Work with your teacher to determine the best breakdown of teams. Also, be sure to divide genders among the teams as appropriate. (Bathroom and Locker Room Teams will need approximately equal numbers of boys and girls.) Working with your teacher, you may need to modify the **Team Worksheets** so that they are applicable for your school. **Team Worksheets** are provided for the following school water-use sections:

Team	Areas to Inventory
Bathroom Team	All student and staff bathrooms (toilets, urinals, sinks and showers) except bathroom facilities in locker rooms.
Classroom Team	Any water-using fixtures in all classrooms (primarily sinks, but may include others).
Kitchen, Hallway and Other Team	All water-using fixtures and appliances in the school kitchen and cafeteria (including sinks, dishwasher, drinking fountains), hallways (drinking fountains) and other areas (such as utility sinks in closets).
Locker Room Team	Locker room facilities (sinks, showers, drinking fountains, toilets, urinals), water-using fixtures in the gym and pool areas.
Outdoor Team	All water-using fixtures/features on the school grounds, including spigots, hoses, sprinklers, irrigation systems, fountains.

Photo: ©Borut Trdina/iStock

- b. Set a deadline for each team to collect data and complete a Water-Use Efficiency Report for their focus area** (Steps 1-3 [approximately two weeks]).

- c. Distribute Team Worksheets and Water-Use Inventory Sheets to each team.** Before starting, each team should carefully review the steps below and on their **Team Worksheet**. Discuss goals and determine how to accomplish tasks. Teams should create a schedule and plan for completing the work. Some steps below can be conducted simultaneously during your water audit, so be sure to read the entire activity carefully before you start and plan ahead.

- d. With teacher approval, start to work on the audit, research and focus area plan following the guidelines below and using the specific instructions on your Team Worksheet.**

water use. For each type of fixture, attempt to determine how much water it uses. See step-by-step instructions below. Your team should meet with the instructor to verify methods for the fixtures and appliances in your focus area.



C. Note possible water-use efficiency issues. On the **Water-Use Inventory Sheet**, note the condition of the fixtures as you inventory them. For example, is a faucet dripping? A toilet running? You will address water-use efficiency issues further in Step 2 (Perform water efficiency and water savings research).

- d. Draw a map showing the location of each appliance/fixture or system you inventory.** Using a blank sheet of paper, create a map showing the space(s) in your team's focus area and develop a system to label each fixture or appliance so it corresponds to the information about it on your **Water-Use Inventory Sheet**. See example map below.

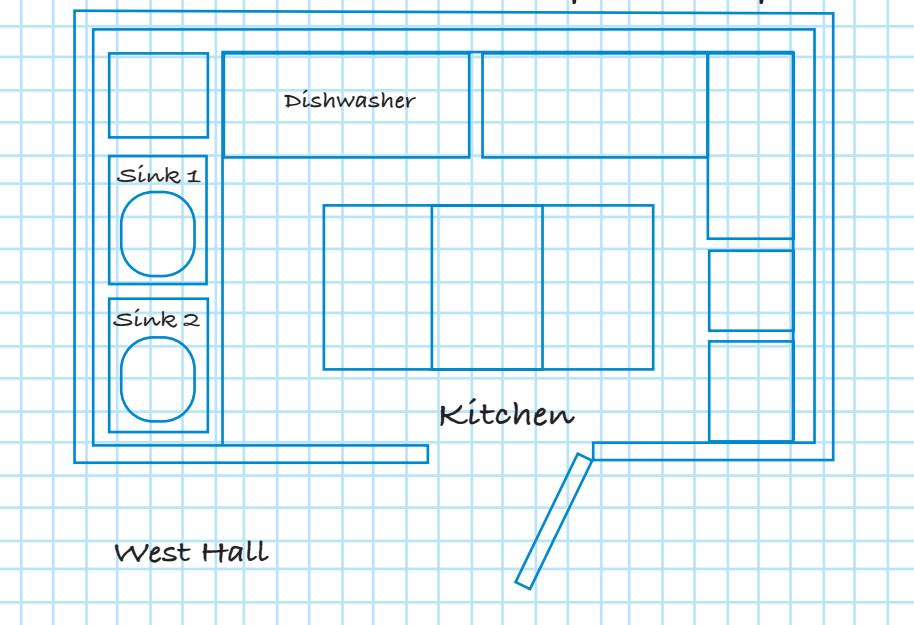
Finding Flow Rates

To determine the flow rate for a faucet, shower or drinking fountain:

1. Collect water in a container while running the tap for 10 seconds.
2. Measure the volume using measuring cups or a graduated cylinder.
3. Multiply this figure by six to calculate flow rate per minute.

Your group may need to conduct research to determine methods for calculating water use for other fixtures.

Kitchen Team Map Example



STEP 1 Inventory your school's water use.

- a. Tour the school to conduct your water audit.** Record your findings on the **Water-Use Inventory Sheet** (your team may need more than one). See your **Team Worksheet** for examples of the type of information you should record on your **Water-Use Inventory Sheet**.

- b. As your team tours the building and catalogs fixtures, attempt to determine**

e. Work together to come up with other ways to learn more about water use in your focus area. Inventorying fixtures gives a realistic picture of where water is used in the school, and calculating water flow can help us understand how much water flows through a fixture. But how water is used requires more research. Brainstorm ways to learn more about water use. (Some ideas are provided for you on your **Team Worksheet**.) Your team might organize interviews or surveys to learn more. Work with your teacher to design creative research plans to learn as much as possible about water use in your focus area.



For a dripping faucet, shower or drinking fountain, students can collect dripping water for one minute. Measure the volume of water, then multiply by 60 to get the amount of water lost every hour. Multiply again by 24 to find the amount of water lost each day.

STEP 2 Perform water efficiency and water savings research.

a. Attempt to quantify water wasted due to leaks and inefficiencies. Return to your **Water-Use Inventory Sheet**; did you identify any water effi-

cency problems during Step 1 (Inventory)? For example, is a faucet dripping? Is a toilet running? If a problem was identified, try to quantify the amount of water wasted. (For a dripping faucet, shower or drinking fountain, students can collect dripping water for one minute. Measure the volume of water; then multiply by 60 to get the amount of water lost every hour. Multiply again by 24 to find the amount of water lost each day.) Your team should meet with the teacher to verify methods. Make notes about what you learn on your **Water-Use Inventory Sheet**.



and/or money it will save?). Try calculating water and cost savings over time. For example, multiply the number of gallons that could be saved over a year by the total number of fixtures that could be replaced. If the school installed more efficient showerheads or low-flow toilets, how many gallons would be saved for every 100 flushes or 100 showers?

Photo: ©Arizona Project WET

b. Conduct a water efficiency study on one fixture or appliance. Choose a fixture or appliance in your focus area, and research that particular type (brand, model) of fixture to determine how much water it uses. Then research more efficient brands or models that could replace this fixture. Research costs and water efficiency. Make a determination: Is it worth replacing this fixture or appliance (is the cost to replace it justified by the amount of water

- What is the structure of your school's administration (who would be involved in your proposed solution and what would implementation look like within your school's administrative structure)?
- How much will this solution cost?
- What will it take for the solution to be implemented? What does the school administration have to do to implement the solution? What does the staff have to do? What do students have to do?
- Does the solution make sense based on your school's location and source of water?
- What school policies does this solution impact?
- Consider various people's possible opinions about this solution. Is this something students will want to do? Teachers? Administrators? Why or why not?

b. Think through any proposed action to determine monetary costs and other potential impacts. When brainstorming, you should also consider how solutions may work within the context of your school. The following aspects should be considered:

- What water-use efficiency steps are already being taken at your school?

team will need to evaluate if the amount of water saved by that solution justifies such a large change. Real water-saving numbers (gallons saved) should be used to discuss the value of a proposed solution.

- c. Prioritize your water-use efficiency ideas.** Which types of water use waste the most water? Which have the simplest solutions? Discuss and weigh the cost (both monetary and otherwise) and benefit of each idea that your team comes up with.
- d. Based on everything your team learned about your focus area, develop a plan to present to the class and/or school officials that will aid in more efficient water use in that area of your school.** Use the **Water-Use Efficiency Report: FOCUS AREA** as a guide.



Photo: ©Susan Chiang/IStock

STEP 4 Present your plan to your class and school officials.

a. Your team should meet with all the other teams so that you can report your team's findings and learn what other teams found.

Your teacher should facilitate this meeting. Each team should have an allotment of time to present to the others as if they were presenting to the school principal or administrators.

b. After all teams have had a chance to present, the entire class should discuss and debate how all plans for water-use efficiency changes fit together. As teams present their findings, areas of overlap may be identified (e.g., both Kitchen and Classroom Teams inventoried a utility sink). Adjustments in proposed



solutions for each focus area may need to be made. The teams should discuss: Are the proposed solutions realistic? Achievable? Affordable? Can they be implemented by school staff and students? Understand that solutions may not be as achievable as they may seem initially when all factors are considered. Some may be great for water conservation but not practical overall. Making decisions and implementing solutions can be complicated. Refer to the factors to consider listed in Item b of Step 3 on page 12–13.

C. The result of this meeting should be one water-use efficiency report and plan for proposed solutions that combines data and ideas from all teams and focus areas. Use the **Water-Use Efficiency Report: SCHOOL**

as a guide to organize all data and suggestions into a concise, factual and persuasive document combining the best and most practical information from the process, along with a summary of the best strategy suggestions.

d. When you and your classmates have agreed upon the report, form a new team of students with representatives from each of the focus area teams. This team will represent the entire class in presenting the report to the appropriate administrators. The teacher should work with you to determine the best audience, time and venue for this final presentation.

STEP 5 Implement the most promising solutions.

a. If some or all of your group's suggestions for water efficiency improvements are approved, be ready to take action!

You and your classmates should work with your teacher as a liaison to proceed with an action plan if approved. Ideally, your hard work in identifying and analyzing school water-use efficiency improvements will be taken into consideration by school officials as they evaluate your suggestions and formulate a plan of action.

This may mean a combination of actions that can be taken by you and/or others in the school (other students, employees, officials).

Remember, adults evaluating your work may be aware of factors that could inhibit some of your suggestions. It is likely that school officials will be impressed by your thorough and professional work even if they

Choose a fixture or appliance in your focus area, and research that particular type (brand, model) of fixture to determine how much water it uses. Then research more efficient brands or models that could replace this fixture. Research costs and water efficiency.

STEP 6 Evaluate metrics.

a. If a plan to improve water-use efficiency moves forward, conduct another water audit after solutions have been implemented.

Compare how much water is used after water conservation methods have been completed to calculate savings in both gallons and dollars. It is critical to continue to monitor and follow up with additional data collection for comparison to baseline data to determine how well your suggested changes are working to improve water-use efficiency in your school.

Extensions

- Conduct a water-use efficiency audit in your home. Use an approach similar to your school water audit. Present your ideas to your parents and siblings. Take action!
- Use data to estimate the total amount of water your school uses each year. How does this compare to the actual amount?

are not in a position to take action. Factors preventing action could range from costs to lack of staff to other considerations outside of your control. Be patient; not all audits result in action.

Student Worksheets

TEAM WORKSHEETS

Download at www.projectwet.org/cleanandconserve.

Bathroom Team

The **Bathroom Team** will count and map all bathroom-related, water-using fixtures in the building—including toilets, urinals and bathroom sinks in student and staff bathrooms.

- Divide into groups of males and females to investigate the bathrooms respectfully.
- Inventory other water-using fixtures or appliances your team finds in your focus area (for example, a staff shower or utility sink).
- Your team will not inventory bathrooms inside locker rooms (these will be done by the Locker Room Team).**

Examples of information you should record on your **Water-Use Inventory Sheet**.

Map Label	Fixture	Location	Usage	Water Usage Calculations	Notes	Suggested Water Efficiency Improvements
1	toilet	Girls' bathroom, J-wing	Toilet, classes only take place during evening in this wing		Hear water running	
2	sink	Girls' bathroom, J-wing	Hand washing	3 gallons per minute		

Suggestions for learning more about bathroom water use (item e of Step 1, “Inventory your school’s water use”). Check in with your teacher to share your ideas before conducting the interviews or surveys.

- Interview custodians or other school staff who might have insight on school bathroom use. Are some bathrooms busier than others? Do they ever find faucets running?
- Respectfully survey other students about bathroom use. How long do students run water to wash their hands? How many times do they visit the bathroom in a day?



Try calculating water and cost savings over time. For example, multiply the number of gallons that could be saved over a year by the total number of fixtures that could be replaced.

Classroom Team

The **Classroom Team** will focus on all water use inside classrooms in your school.

- Inventory and map all sinks and any other water-using fixtures or appliances you find in classrooms.
- Obtain information on classroom sink use by interviewing or surveying students and/or teachers from individual classrooms.

Examples of information you should record on your **Water-Use Inventory Sheet**.

Map Label	Fixture	Location	Usage	Water Usage Calculations	Notes	Suggested Water Efficiency Improvements
1	faucet	Mr. Jones' Science Classroom (Room 4B)	Cleaning science equipment; water for experiments; watering plants	3 gallons per minute	Faucet dripping	

Suggestions for learning more about classroom water use (item e of Step 1, “Inventory your school’s water use”). Check in with your teacher to share your ideas before conducting the interviews or surveys.

- Interview teachers, students and custodians about classroom water use. Does the class use the sink to fill water bottles? Wash hands? Water plants? Does the custodian use the sink when cleaning?

Locker Room Team

The **Locker Room Team** will focus on all water use within the locker rooms, as well as in the gym and pool areas.

Divide into groups of males and females to investigate the locker rooms respectfully.

- In each locker room, inventory and map all toilets, urinals, sinks, showers and drinking fountains (**the Bathroom Team will not inventory locker room bathroom fixtures**).
- If there is a pool, obtain information about water use by interviewing appropriate staff (see below).
- Find out how much water flows in a shower before it is warm enough to step in (this water is wasted).

Examples of information you should record on your **Water-Use Inventory Sheet**.

Map Label	Fixture	Location	Usage	Water Usage Calculations	Notes	Suggested Water Efficiency Improvements
1	toilet	Girls' locker room	Toilet			
2	sink	Girls' locker room	Hand washing	3 gallons per minute	dripping	
3	sink	Girls' locker room	Hand washing	3 gallons per minute		

Suggestions for learning more about locker room water use (item e of Step 1, “Inventory your school’s water use”). Check in with your teacher to share your ideas before conducting the interviews or surveys.

- Interview custodians, gym teachers or other school staff who might have insight on school locker room use. Do they ever find faucets or showers left running?
- Survey other students about their locker room use. How long do students run water to wash their hands? How often do they take a shower in the locker room and for how long?

Kitchen, Hallways and Other Areas

The **Kitchen Team** will focus on all water use in the school kitchen and cafeteria, hallways and any other areas not covered by other teams.

- Inventory and map all sinks and any other water-using fixtures or appliances you find in these areas.
- Your team may need to work with administrators and custodians to determine areas of the school not cataloged by other teams.

Examples of information you should record on your **Water-Use Inventory Sheet**.

Map Label	Fixture	Location	Usage	Water Usage Calculations	Notes	Suggested Water Efficiency Improvements
1	Dishwasher	Kitchen	Washing dishes used to prepare cafeteria food	Research needed on specific dishwasher model	Run 3 times per day	
2	Faucet with sprayer nozzle	Kitchen	Rinsing dishes, cooking	3 gallons per minute	Drips when automatically shuts off	
3	Drinking fountain	J wing hallway	Drinking water, filling water bottles	3 gallons per minute	Doesn't work properly—low flow fix flow problem	
4	utility sink	J wing hallway (see map)	Cleaning	10 gallons per minute	Need to talk to custodian to learn more	

Suggestions for learning more about kitchen, hallway and other water use (item e of Step 1, “Inventory your school’s water use”). Check in with your teacher to share your ideas before conducting the interviews or surveys.

- Interview kitchen staff, students, teachers and custodians about water use. What are all the ways the kitchen staff use water? Washing hands? Cooking? Cleaning? How often does the custodian use the utility sink when cleaning?



Photo: ©JonathanLesage/iStock

Student Worksheets

Outdoor Team

The **Outdoor Team** will focus on all water use outside the school building on school grounds.

- Your team will inventory and map all spigots, sprinklers, hoses, fountains, outside drinking fountains and artificial ponds on the school grounds.
 - Work closely with school lawn maintenance specialists. Irrigation systems may be automated, and some water use may not be observed during school hours.

Examples of information you should record on your **Water-Use Inventory Sheet**.

Map Label	Fixture	Location	Usage	Water Usage Calculations	Notes	Suggested Water Efficiency Improvement
1	spigot	North gym wall	Connect hose to water flower beds	3 gallons per minute	Watering done with hose running, no nozzle (interview with lawn maintenance)	Nozzle to stop flow
2	irrigation system	Soccer field (see map)	Watering playing field	1 inch per 20 minutes*	Sprinkler head broken	

*Instructions for measuring sprinkler flow can be found here:

www.wateruseitwisely.com/100-ways-to-conserve/landscape-care/principles-of-xeriscape-design/efficient-irrigation/#lawns

Suggestions for learning more about outdoor water use (item e of Step 1, “Inventory your school’s water use”).

Check in with your teacher to share your ideas before conducting the interviews or surveys.

- Interview school lawn maintenance specialists and custodians about outdoor water use. Does the school have an automated sprinkler system? When does it come on? Does it have an automatic rain sensor that shuts it off if it is raining? Does the school use moisture sensors? Does the school use rain barrels? What is the watering rate? What is the watering schedule? Does it change per season?



Check in with your teacher to share your ideas before collecting water data or conducting surveys.

Photo:
©Arizona Project W

Water-Use Inventory Sheet

Download at www.projectwet.org/cleanandconserve.

Focus Area: _____ Date: _____

Date: _____

Group Members:

Water-Use Efficiency Report: FOCUS AREA

Use this form as a guideline to summarize your findings in a report.
Download at www.projectwet.org/cleanandconserve.

Focus Area: _____ Date: _____

Group Members: _____

Now that your class has gathered baseline data for your focus area, draw conclusions and make informed suggestions to your school.

Major water uses in your focus area: _____

Major leaks or other issues found in your focus area (identify specific fixtures): _____

Suggested water-use efficiency improvements (general or specific) and outcomes. Be sure to indicate if action is a behavioral or technological change.

Fixtures, Appliances, Systems	Proposed Action	Anticipated Result (water saved, money saved)	Possible Outcomes (positive and negative)

Water-Use Efficiency Report: SCHOOL

Use this form as a guideline to summarize your findings in a report.
Download at www.projectwet.org/cleanandconserve.

Now that your class has gathered baseline data for your school, draw conclusions and make informed suggestions to your school.

Major water uses in your school: _____

Major leaks or other issues found in your school (identify specific fixtures): _____

Suggested water-use efficiency improvements (general or specific) and outcomes. Be sure to indicate if action is a behavioral or technological change.

Fixtures, Appliances, Systems	Proposed Action	Anticipated Result (water saved, money saved)	Possible Outcomes (positive and negative)



Write a concise and factual statement (no longer than one page) about the water-use efficiency audit process and practical suggestions and strategies for water-use efficiency improvements based on the data collected and class analysis. Be sure to include examples of evidence when possible.

Break the Chains



Photo: ©luchschchen/iStock

Introduction

If you could stop yourself or a friend from getting sick with an infectious disease like the flu, would you do it? Of course! While no single action can prevent illness, there are ways for individuals and groups to take steps to “break the chains” of infection. In this activity you will research some of the bacterial and viral infectious diseases that are present where you live and determine methods for preventing those diseases. Armed with this knowledge, you can take action in your school to help yourself and other students stay healthy.

Infectious Disease

Infectious diseases are illnesses that affect humans (and/or other animals) and are caused by microscopic agents such as bacteria, viruses, parasites or fungi. In this activity we will focus on infectious diseases caused by bacteria and viruses.

These **pathogens** (anything that causes a disease) are very tiny and cannot be seen by the naked eye. **Bacteria** are single-celled organ-

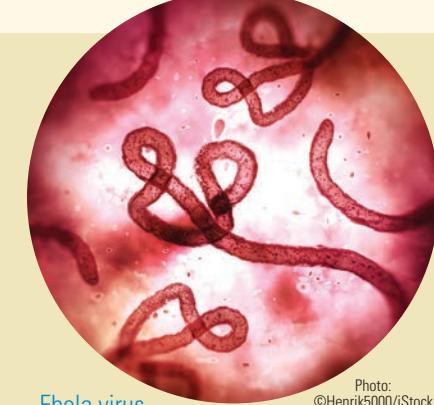


Photo: ©Henrik5000/iStock

Disease Detectives

Epidemiologists are scientists who study diseases—and work to determine the source of an outbreak and control the cause and spread. A recent global example of the work of epidemiologists is tracking the source of the 2014 Ebola virus outbreak in West Africa. By working backward, epidemiologists were able to trace the outbreak to a small child coming into contact with a diseased bat in a small village in the country of Guinea.

isms. **Viruses** are smaller than bacteria and must use host cells to carry out biological processes such as reproduction. Viruses invade the cells of humans and other organisms and utilize their cells to replicate. Without a host, viruses are otherwise **dormant** (do not show biological signs of life).

Infectious diseases are transmitted from person to person, or animal to person, through **direct** or **indirect contact**. Di-

Hard Surfaces	Soft Surfaces
Desks and tables	Skin (hands)
Door handles	Clothing
Pencils and pens	Upholstery
Mobile phones	Towels
Utensils	Linens
Tablet touchscreens	Carpet
Dishes	
Railings	
Vending machine buttons	
Gym equipment	
Drinking fountains	
Computer keyboard and mouse	

Transmission chain: steps, including direct or indirect contact with hard and soft surfaces, that allow pathogens to spread and lead to one person infecting another with disease.

rect contact means touching an infected person or animal. Indirect contact means the infected person touches a surface, and pathogens that remain behind on the surface are transmitted to another person when they touch the same surface.

Indirect disease transmission can occur on **hard surfaces** or **soft surfaces**. (See examples above.)

Infectious diseases can also be **foodborne** (transmitted by food), **waterborne** (transmitted by water) or **airborne** (transmitted through the air).

Another highly contagious viral disease is called Norovirus. Norovirus is the most common cause of what we commonly call the “stomach flu” and can be passed directly or indirectly and through food and water. (See **Disease Card** on page 24.)

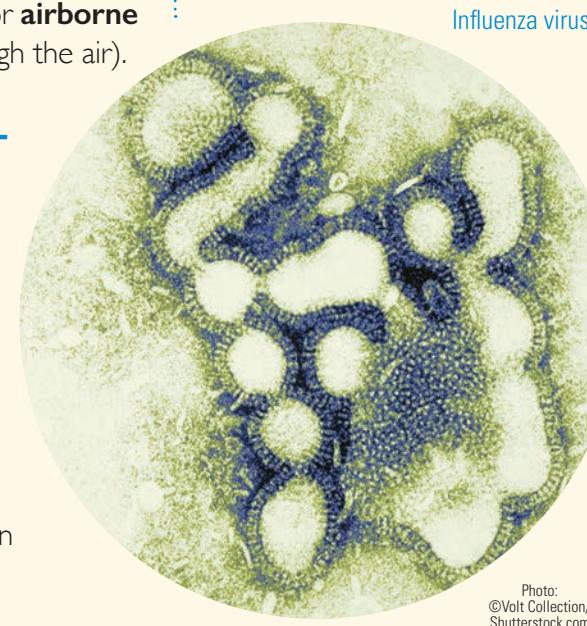
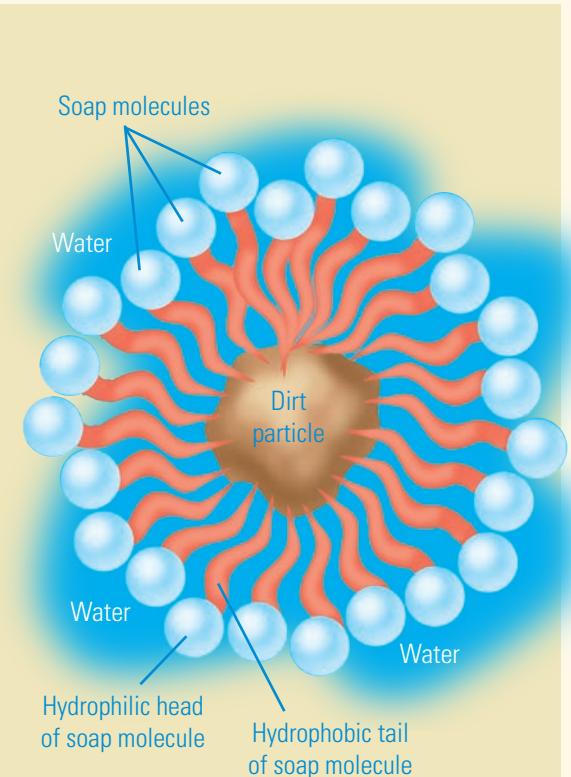


Photo: ©Volt Collection/Shutterstock.com

Common Infectious Diseases

Have you ever had the flu? Food poisoning? If so, you acquired a common infectious disease. **Influenza** is a highly **contagious** (easily spread) infection caused by a virus.



How Soap Works

Since you were a small child, you've been told to wash your hands with soap and water. But why? What is the science behind hand washing? The chemistry of soap is the key to removing dirt and germs (including bacteria and viruses) from your hands. One end of the soap molecule is **hydrophilic** (attracted to water molecules) and wants to bond with a water molecule. The other end of the soap molecule is **hydrophobic** (repels water molecules). One end of the soap molecule attaches to water molecules, and the other latches onto the dirt and germs—and it all washes off your hands and down the drain as you rinse.

If soap and water are not available, an antibacterial hand sanitizer containing at least 60 percent alcohol is the next best option. Instead of removing dirt and germs, hand sanitizer uses alcohol to kill bacteria and viruses. Use a dime-sized amount, rub over hands and allow to dry (don't wipe off). Hand sanitizer works well to kill bacteria on hands, but it does not remove dirt or grease—or common classroom contaminants like chemicals found in markers, glue, paint and white-out.

Disease Card

Norovirus

Other names for the disease	<ul style="list-style-type: none"> stomach flu, acute gastroenteritis, food poisoning
What causes the disease?	<ul style="list-style-type: none"> The term Norovirus encompasses many different types of viruses.
How is the disease spread?	<ul style="list-style-type: none"> Norovirus is found in an infected person's stool before and after they actually get sick. The pathogen can be passed through direct contact (touching), or indirect contact by touching infected surfaces, or eating infected food or drinking infected beverages. Norovirus can spread especially quickly in close quarter environments such as daycares, schools and nursing homes.
How long is the disease infectious? (May vary by surface.)	<ul style="list-style-type: none"> Norovirus can live in an infected person's stool before they actually get sick and for over two weeks after they recover. Noroviruses are resistant to heat, cold and disinfectants. Noroviruses may live on surfaces for days to weeks.
Create a transmission chain(s) for your disease.	<ul style="list-style-type: none"> A passenger on a cruise ship already has Norovirus in his system when he boards. → He touches multiple surfaces throughout the day. → Due to the close quarters on board the ship, other passengers touch the same, now-infected surfaces. → Other passengers touch their faces, noses and mouths, transmitting the virus to their bodies. → Many passengers end up with vomiting and diarrhea. A passenger on a cruise ship already has Norovirus in his system when he boards. → He touches multiple surfaces throughout the day. → Due to the close quarters on board the ship, other passengers touch the same, now-infected surfaces. → Other passengers wash their hands with hot water and soap frequently. → Other passengers may touch their faces, noses and mouths, but Norovirus is prevented due to handwashing.
How can the disease be prevented? Use a transmission chain diagram(s) to show how preventative actions can break the chain of transmission.	
What are the symptoms of the disease?	<p>Diarrhea • Vomiting • Nausea • Stomach pain • Fever • Headache • Body aches</p>
How long does it take for symptoms to show up (incubation period)?	<ul style="list-style-type: none"> Symptoms usually show up within 12-48 hours after being exposed to the virus.
How is the disease treated?	<ul style="list-style-type: none"> No treatment for virus. Drink fluids to combat dehydration from vomiting and diarrhea.
Find a (preferably local) case study about this disease.	<ul style="list-style-type: none"> On a seven-day cruise in 2002, 84 of the 2,318 passengers developed symptoms of gastroenteritis. The ship was taken out of commission for one week and was disinfected thoroughly. However, on the next cruise, 192 of the 2,456 passengers and 23 of the 999 employees also developed the illness. Investigation concluded that the initial infection was foodborne and was then passed from person to person (infected employees likely causing the illness to affect multiple cruises). wwwnc.cdc.gov/eid/article/11/1/pdfs/04-0434.pdf
How does this relate to me? How does or how could this disease impact my school?	<ul style="list-style-type: none"> Norovirus could be transmitted in schools when students and faculty do not wash their hands thoroughly. It could also potentially be transmitted through cafeteria food that is not handled or cooked properly.
List at least five practical ways to prevent the spread of this disease in your school.	<ul style="list-style-type: none"> Wash hands thoroughly after using the bathroom or changing a diaper. Wash hands regularly with hot water and soap. Stay home if you have symptoms of Norovirus. If you are or have been sick, do not prepare food for others. Wash hands thoroughly before and after cooking and handling food. Disinfect hard and soft surfaces regularly and soiled surfaces with proper disinfectants.

Disease Card

Influenza

Other names for the disease	<ul style="list-style-type: none"> the flu, influenza
What causes the disease?	<ul style="list-style-type: none"> Influenza is caused by a virus.
How is the disease spread?	<ul style="list-style-type: none"> Airborne (up to six feet away), indirect contact. Infected people can be contagious one day prior to their symptoms appearing and 10 days or more after developing symptoms. In the northern hemisphere, flu is worst from November to March when the air is cold and dry and the flu virus can be most easily transported through the air. The flu virus mutates, which means new vaccines must be developed from one year to the next.
How long is the disease infectious? (May vary by surface.)	<ul style="list-style-type: none"> The flu virus sitting on a surface may remain contagious for between two and eight hours.
Create a transmission chain(s) for your disease.	<ul style="list-style-type: none"> Student 1 has contracted the flu but does not yet show symptoms. → Student 1 touches a door handle. → Student 2 touches the door handle to open the door. → The virus is transmitted to the hands of Student 2. → Student 2 rubs his/her eyes. → Flu virus enters body through eyes. → Student 2 gets influenza.
How can the disease be prevented? Use a transmission chain diagram(s) to show how preventative actions can break the chain of transmission.	<ul style="list-style-type: none"> Student 1 has contracted the flu but does not yet show symptoms. → Student 1 touches a door handle. → A disinfectant is used regularly to clean door handle. → Student 2 opens the door. → Student 2 does not get influenza. Student 1 has contracted the flu but does not yet show symptoms. → Student 1 touches a door handle. → Student 2 touches the door handle to open the door. → The virus is transmitted to the hands of Student 2. → Student 2 washes his/her hands thoroughly. → Student 2 rubs his/her eyes. → Student 2 does not get influenza.
What are the symptoms of the disease?	<p>Cold symptoms (runny nose, congestion, sore throat, sneezing) Fever (more than 100 degrees F.) • Headache • Muscle aches Chills and sweats • Fatigue • Cough</p>
How long does it take for symptoms to show up (incubation period)?	<ul style="list-style-type: none"> Influenza symptoms appear from one to four days after infection (typically two days).
How is the disease treated?	<ul style="list-style-type: none"> Influenza can be treated early by taking an antiviral medication prescribed by a doctor. However, mainly rest and fluids are needed to let the infection run its course. Over-the-counter pain relievers may also lessen fever and aches.
Find a (preferably local) case study about this disease.	<ul style="list-style-type: none"> A severe strain of influenza called H1N1 spread globally beginning in April 2009. More than 60 million Americans got H1N1, and 12,500 died. A vaccine for H1N1 was developed. www.cdc.gov/h1n1flu/estimates_2009_h1n1.htm
How does this relate to me? How does or how could this disease impact my school?	<ul style="list-style-type: none"> With many students and staff interacting closely at school, it is easy for a contagious disease like influenza to spread. If you come to school with the flu, you could easily infect others. Practicing methods to prevent the flu is in everyone's best interest in a school.
List at least five practical ways to prevent the spread of this disease in your school.	<ul style="list-style-type: none"> Get a flu vaccination. Wash your hands thoroughly and regularly as you touch many surfaces that could be infected (such as door handles, keyboards). If you think you have the flu, see a doctor right away and stay home until you are well. Cover your mouth and nose when you cough or sneeze, then wash your hands and dispose of tissues properly. Or cough or sneeze into the crook of your elbow. Disinfect high-touch surfaces such as door handles, counters, desktops, computer keyboard and mouse often.

Break the Chains



Photo: ©Sean_Warren/iStock

How Vaccines Work

Vaccines work with your body's natural defenses to greatly reduce your risk of infection from viral or bacterial diseases. When disease-causing viruses or bacteria enter your body, they multiply. Your body produces white blood cells and antibodies that work together to attack infections. It takes your body a little while to gear up and effectively fight an infection. Once it does, it "remembers" what it did the first time and is ready for a fight if the same type of infection strikes again.

Vaccines imitate different kinds of infections in your body so that you can produce antibodies to protect you if you are exposed to the real disease in the future. The imitated infection is designed to expose you to mild levels of the infection so your body can learn what to do if an actual infection occurs. You can learn more about how vaccines work here: www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/vacsafe-understand-color-office.pdf

Vaccine shot

Infectious Diseases Where You Live

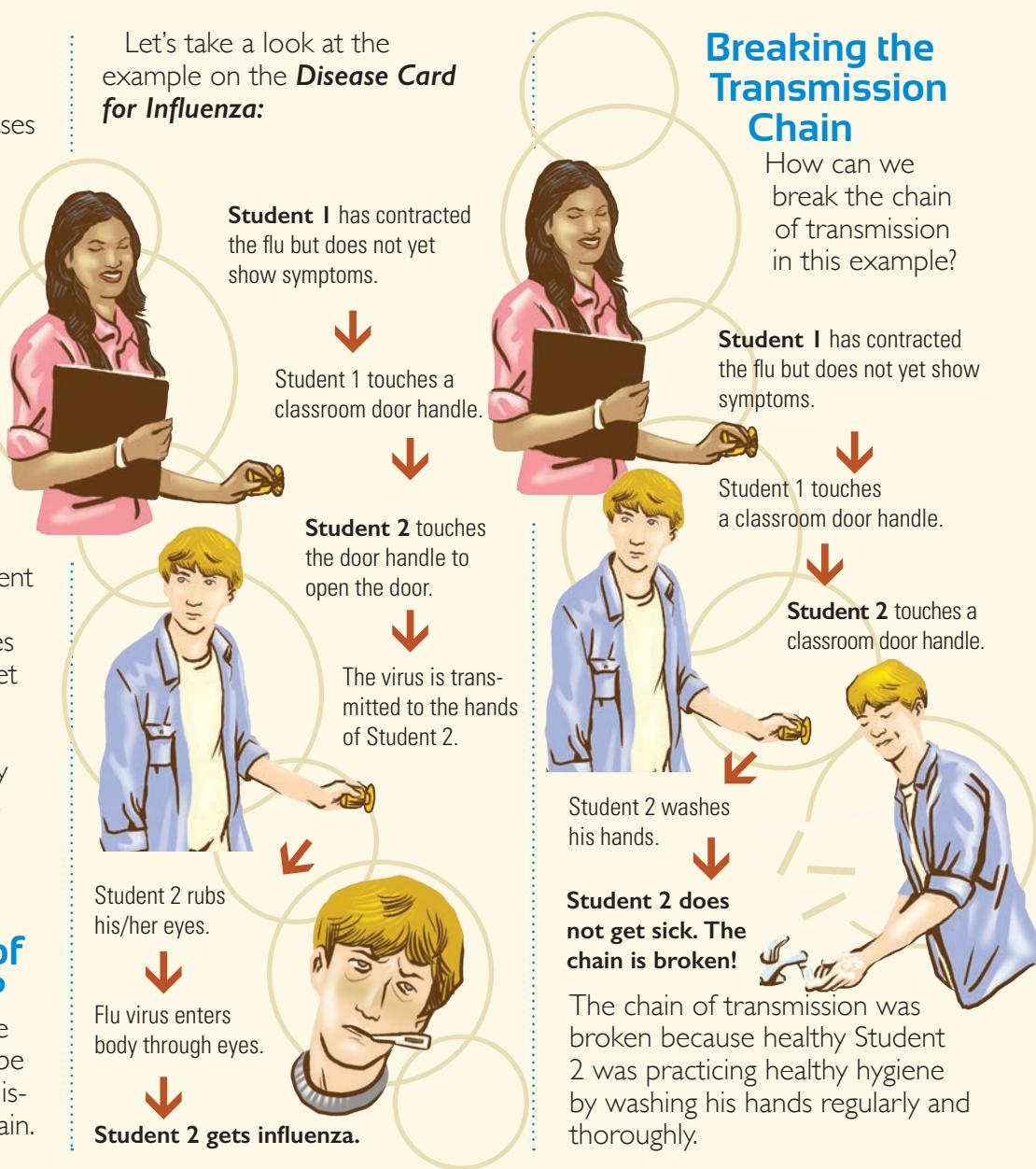
Certain types of infectious diseases are more likely to be found in some areas than in others due to a variety of factors. Climate affects which infectious diseases may be found in a region. For example, some diseases, such as malaria and dengue fever, are classified as tropical diseases because they thrive in hot, humid climates.

The types of diseases found where you live may also be affected by the level of development in your area. Often developing areas have not had the resources or opportunity to **eradicate** (get rid of) some infectious diseases that may not be found in more developed regions. In this activity you will research which diseases are most common in your area.

How Can We Prevent the Spread of Infectious Diseases?

The spread of infectious disease can be visualized as a chain. To be able to prevent the spread of disease, we need to break that chain.

Let's take a look at the example on the **Disease Card for Influenza**:



Ways You Can Break the Chains of Infectious Disease Transmission

Get vaccinated.

- Vaccines help your body develop an **immunity** (resistance) to a disease. Getting vaccinated greatly diminishes the ability for that disease pathogen to affect you and make you sick. If a vaccine is available for an infectious disease in your area or an area you will be visiting, getting vaccinated is the best form of prevention.

Disinfect hard and soft surfaces.

- Clean high-touch surfaces often (e.g., desks, countertops, door handles, computer keyboards, hands-on learning items, faucet handles, phones and toys).
- Use **disinfecting** (chemicals that kill pathogens) products. Your school likely already has these products, but a list of Environmental Protection Agency-approved products can be found here: www.epa.gov/opp001/influenza-a-product-list.pdf.
- Directions for homemade disinfecting solution for hard surfaces (**this solution contains bleach and should only be made and used by an adult**):

Add 1 tablespoon of bleach to 1 quart (4 cups) of water. For a larger supply of disinfectant, add ¼ cup of bleach to 1 gallon (16 cups) of water. Apply the solution to the surface with a cloth. Let it stand for 3 to 5 minutes. Rinse the surface with clean water.

- Use disinfecting wipes approved for electronics on any electronic equipment.
- Wash dishes and utensils with soap and water (in a dishwasher or by hand).
- Wash clothing and other fabrics in a washing machine with soap.

Wash your hands.

- Wash your hands before, during and after you cook.
- Wash your hands before eating, caring for a sick person or treating a wound.
- Wash your hands after you use a toilet, change a diaper, blow your nose, sneeze or cough, touch pets, pet food or pet waste or touch garbage.
- How to wash your hands thoroughly:

Wet your hands with clean, running water, turn off the tap and apply soap.

Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers and under your nails.

Scrub your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.

Rinse your hands well under clean, running water.

Dry your hands using a clean towel or air dry them.

- If you can't wash your hands with soap and water, use a hand-sanitizing solution that contains at least 60 percent alcohol.

Other

- Stay home when you are sick.
- Use the crook of your elbow to cover your mouth when you cough or sneeze.

Here are ways to break this chain of transmission:

1. Disinfect door handles regularly.
2. Stay home from school when sick.

As you can see, there is more than one way for an infectious disease to spread, and there is more than one way to break the transmission chain.



Watch this video to see how quickly an infectious disease can spread among a group, and then think about ways this could be avoided. www.vimeo.com/11643110.

Although different diseases spread along different paths, there are several things we can do that will help stop the transmission for most types of infectious disease. These actions help to break the chains of transmission even if you don't know what bacteria or viruses you could be exposed to.

ACTIVITY

Break the Chains: Preventing the Spread of Infectious Disease

Various types of bacteria growing on petri dishes.

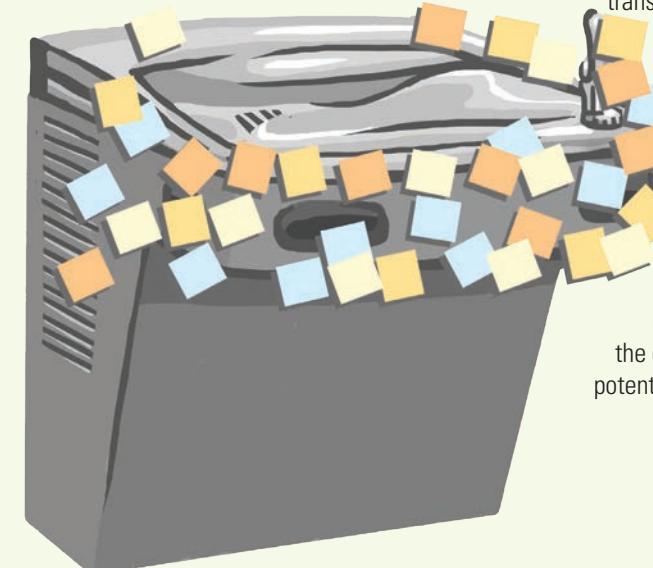
You will need:

Warm Up

- Self-stick notes

Activity

- **Disease Card** (one per student)
- Access to library and/or Internet for research



Warm Up

- Choose a time frame, such as your first class period, in which to conduct the Warm Up activity with fellow students.
- Distribute self-stick notes to some or all of your classmates. Each student will need several (10–20). Students should write their name on each self-stick note.
- At the beginning of the chosen time period, you and your classmates should go about your work as usual, but every time you touch a surface (desk, pen, paper, pencil sharpener, another student, door handle, etc.), leave a note with your name on it indicating that you touched that surface.
- At the end of the designated time period, all students should stop adding notes to surfaces. Students should look around the room and determine by the number of notes which are the most-touched surfaces in the classroom.
- Ask for a student to volunteer to represent someone with an infectious disease (such as the flu). Identify surfaces touched by that student. Discuss with the class:
 - Which surfaces are most likely to transmit disease in your classroom?
 - How many students may have been infected by the disease?
 - Calculate the percentage of students in the class that touched the potentially infected surfaces.

Photo: ©villorejo/Shutterstock.com

Activity

STEP 1

Select a bacterial or viral infectious disease in your area.

- a. Choose a bacterial or viral disease that has affected people in your area. You may need to conduct some research to find out what diseases are found in your area. Your local hospital, urgent care clinic or county health department are good resources. It may help to discuss ideas with your classmates, family and friends.
- b. Once you and your classmates have chosen your diseases, check with your teacher to ensure that the class will be researching a variety of diseases. Your teacher may need to make adjustments regarding which student is focused on which disease.
- c. With your fellow students, identify a time frame for research and a time to meet and share your findings. This could be one to two weeks.

For information on infectious diseases in your area, contact your local hospital, urgent care clinic or county health department.

STEP 2

Research your infectious disease.

- a. Use the blank **Disease Card** on page 31 for your chosen disease (or download from www.projectwet.org/cleanandconserve).

STEP 3

Present to the class.

- a. At the time established in Step 1, meet with your classmates.
- b. Allot a time period for each of you to present about your disease to the class (e.g., five minutes each). Do not just read your **Disease Card**. Present the most pertinent information as it applies to your school. Present your ideas for ways this disease can be prevented in your school. Listen carefully to each other's presentations. You will be synthesizing this information in the next step.



Photo: ©477434sean/iStock

STEP 4

Identify best practices.

- a. During the class presentations, you will identify ways to prevent the spread of disease that are effective with several types of diseases. These are called **best practices** (the most effective ways to prevent the spread of disease).

Best Practices to Prevent the Spread of Disease:

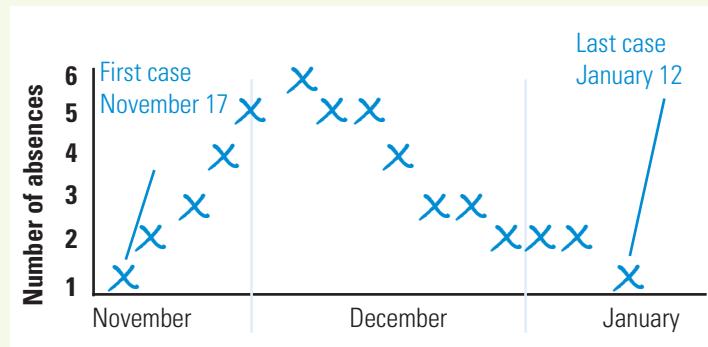
 - regular, thorough hand washing with soap and water
 - disinfection of hard and soft surfaces using soap and water or a disinfecting solution.
- b. As a group, identify and make a list of the most common and important best practices for disease prevention (the best practices that came up most often during class presentations). Involve your teacher in this process.

Break the Chains

As you discuss your list, note the pros, cons and challenges to implementing these best practices in your school. Discuss ways to realistically overcome the challenges, and whether or not these best practices are practical or possible.

Best Practice	Pros	Cons	Challenges	Possible Solutions
Regular, thorough hand washing with soap and water	<ul style="list-style-type: none">Cleaner handsReduced risk of spreading disease	<ul style="list-style-type: none">More trips to the bathroomMore soap usedMore water used	Working with teachers to allow more trips to the classroom sink.	<ul style="list-style-type: none">Set up hand washing station at your classroom sink.Allow five minutes for a bathroom break at a designated time.

Extensions



- Work with your school administration to graph data for the number of student absences over the past months or years (may need to calculate average number of absences per month). Interview staff and students and use anecdotal evidence to correspond periods of increased absences to specific disease outbreaks at your school.
- Design an awareness-raising campaign using PowerPoint, Prezi or social media. Share with your fellow students.



Photo:
©Guntars Grebezs/Stock

Disease Card

Other names for the disease

What causes the disease?

How is the disease spread?

How long is the disease infectious? (May vary by surface.)

Create a transmission chain(s) for your disease.

How can the disease be prevented?

Use a transmission chain diagram(s) to show how preventative actions can break the chain of transmission.

What are the symptoms of the disease?

How long does it take for symptoms to show up (incubation period)?

How is the disease treated?

Find a (preferably local) case study about this disease.

How does this relate to me? How does or how could this disease impact my school?

List at least five practical ways to prevent the spread of this disease in your school.

Ages 12-17

This project guide is correlated to the **Common Core English Language Arts, Common Core Math and Next Generation Science Standards**. For a list of standards, visit www.projectwet.org/cleanandconserve.



WATERSTAR™

The **WaterStar recognition program** encourages students and educators to contribute to a positive water future by learning about water and taking appropriate local action. For information on how to become a WaterStar, visit www.projectwet.org/waterstar.

To download this and other publications, and for information on online trainings and curriculum standards, visit www.projectwet.org/cleanandconserve.

ISBN: 978-1-942416-31-9

Published by the Project WET Foundation
Dennis L. Nelson, President and CEO

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First printing, August 2015.
Printed in the United States of America.

Cover:
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Vision: Every child understands and values water through action-oriented education, ensuring a sustainable future. www.projectwet.org



This booklet made possible with funding from the Ecolab Foundation. Ecolab is the global leader in water, hygiene and energy technologies and services. Learn more at www.ecolab.com.

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