



# KACEE

KANSAS ASSOCIATION FOR  
CONSERVATION &  
ENVIRONMENTAL  
EDUCATION

KANSAS



Green Schools  
[www.kansasgreenschools.org](http://www.kansasgreenschools.org)

## Water Investigation



KACEE- Kansas Association for  
Conservation and Environmental Education

Kansas Green Schools Program

2610 Claflin Rd.

785-539-7943

# Table of Contents

## Water Investigation

**Part 1. Introduction-** KACEE and the Kansas Green Schools Program.....Pg. 3

**Part 2. Leadership Resources-** Background Information.....Pg. 4-9

**Part 3. Water Investigation Materials**

Directions for Green Team Leaders and Getting Ready to Begin the Investigation.....Pg. 10-12

**Part 4. Water Investigation**

About the KGS Water Investigation, Green Team Sign Up, Introduction to Water .....Pg. 13-14

Where Does Our Water Come From? .....Pg. 15-16

What’s in Our Water?.....Pg. 16-18

Where Does Our Water Go?.....Pg. 18-19

How Does Water Help Us Stay Healthy?.....Pg. 19

Water Usage and Our School.....Pg. 19-21

Water Usage and Our Classroom.....Pg. 21-22

How We Use Water in the School.....Pg. 23-24

Water Usage in Our School Grounds.....Pg. 25-26

Curriculum and Community.....Pg. 27-28

Action Plan/ Water Action Plan Template.....Pg. 28-30

Home Connections.....Pg. 31

**Part 5. Resources**.....Pg. 32

**Part 6. Curriculum Connections**.....Pg. 33-34

## Part 1: Introduction



# KACEE

KANSAS ASSOCIATION FOR  
CONSERVATION &  
ENVIRONMENTAL  
EDUCATION

- KACEE has been promoting and providing conservation and environmental education for all Kansans since 1969.
- KACEE supports community education, outreach and engagement programs statewide to advance the mission of our natural resource agency, higher education, and non-formal education partners.
- KACEE's environmental education curricula help teachers improve student achievement, engagement in STEM, critical thinking, problem solving, and 21<sup>st</sup> century job skills.
- KACEE's professional development programs give educators the confidence to take students outdoors to learn with hands-on activities that are fun and meaningful for students.
- Environmental Education connects kids to nature, supports healthier, active lifestyles, and encourages students to take action to improve their school and environment.
- KACEE encourages and recognizes outstanding achievement through Excellence in Conservation and Environmental Education Awards and Kansas Green Schools Recognition programs.
- Kansas is the only state to have a unique, collaborative partnership with KACEE, Project Learning Tree and the National Wildlife Federation to coordinate Green School certification and recognition between state and national programs.
- Since 1998, the KS Green Schools Program has connected students to their community and the world, while growing problem-solving and leadership skills through service learning projects.
- KS Green Schools investigations engage students in exploring their school's energy, water, school grounds, waste management and creating a greener and healthier learning environment.
- The KS Green Schools Network supports teachers in creating greener and healthier schools through training, networking, grant funding, curriculum resources, and more!
- The KS Green Schools program celebrates and recognizes schools across the state for their green achievements through the KS Green Schools recognition program.
- The KS Green Schools Network connects and inspires teachers in over 500 Kansas Green Schools through an annual Green Schools Conference, Online Forum, Green Schools Updates, Professional Development Workshops, Facebook, and more!



Fan us on Facebook at [www.facebook.com/groups/kansasgreenschools](http://www.facebook.com/groups/kansasgreenschools)

Here you can connect with KACEE and to hundreds of Kansas Educators!

## Part 2: Leadership Resources

### Correlations to Academic Standards

The Kansas Green School Investigations are designed to support your efforts in the classroom with many national education standards. To keep up to date with the correlations, visit <http://www.plt.org/correlations>.

### Career and Technical Education for Kansas Kids

Tying Kansas kids to real world applications is a great way to engage your students in the investigations. We encourage you to introduce your students to real world professionals throughout the investigations to increase the direct learning opportunities and to increase the depth of experiences. Here are a few of the fields that students may discover throughout the investigations:

- Water Treatment Plant Technician/Operator
- Hydrologist
- Hydrogeologist
- Civil Engineer
- Regulatory Compliance with Water
- Water Resources Planner
- Water Rights Law and Policy Specialist
- Water Educator
- Water Health and Safety Field
- Water Chemistry Scientist
- Xeric Landscape Specialist
- Water Reclamation Field
- Water Conservation Field
- Water Quality Field

## Why Should Students Study Water?

**How much water does the United States use every day? Over 400 billion gallons of water!**

That's a huge amount, especially because **only about 0.003 percent of the Earth's water is available for us to use.** The remainder of water on the Earth's surface is either in our oceans (saltwater), is locked up in glaciers and polar ice caps, or is located too deep in the ground to extract. Students who understand this concept understand how important it is to conserve water and improve the water quality as well as various other issues.

**Because water is essential to all living things, water consumption will continue to be an important issue for generations to come.** Although water delivery and treatment systems are sophisticated in many countries, the Earth's population continues to grow, and continues to place ever-increasing demands on water consumption. A more informed citizenry has the potential to come up with better solutions to our water consumption problems and knows the importance of water quality and water conservation.

The role of educators is fundamental to this process.

**Water consumption and its associated challenges bring together the fields of science, technology, engineering, math, political science and health as well as finances.** The students in your classroom will be the policy makers, scientists and voters of tomorrow. It is critical to help students realize that they can make decisions and take responsible action, which, in turn, can have positive results in their community.



## What Should I Know About the Water in My State?

We all know that when we turn on the faucet, water comes out, but not all of us know that less than 1% of the water on Earth can be used by people. That makes water an important resource for us all. In Kansas, two agencies are charged with protecting and preserving the water in our state: Kansas Department of Health and Environment (<http://www.kdheks.gov>) and Kansas Department of Agriculture (<https://agriculture.ks.gov/>). A third agency, the Kansas Water Office, works with the public to develop policies for water in Kansas. People can have input toward these policies by attending Kansas Water Authority and/or Basin Advisory Committee Meetings. For more information on the Kansas Water Authority and the Basin Advisory Committees, visit <https://www.kwo.ks.gov/>. The state of Kansas has 12 principal river basins (map located at [https://www.kdheks.gov/ars/swp/swp\\_basin.html](https://www.kdheks.gov/ars/swp/swp_basin.html)). Within these river basins are watersheds, some of which are protected by Watershed Restoration and Protection Strategy groups, also known as WRAPS. These WRAPS groups develop and implement plans to make sure that we have fresh, clean water in our watersheds. To find out if your watershed has

a WRAPS group, visit [www.kswraps.org/directory](http://www.kswraps.org/directory). You can also find out if your location is in a watershed by a watershed map found at <http://www.kswraps.org/maps>. You can view the **WRAPS Directory** for contact information to learn more about projects, the quality and more with what's happening in your local watershed (<https://kswraps.org/directory/>).

Another partner in the state of Kansas that helps protect our water is the Kansas Forest Service. Trees and other plants help to protect our water by filtering out pollutants from runoff before they make it into our waterways. Streamside forests, also known as riparian forests, protect water quality for more than 134,400 miles of streams, creeks and rivers in Kansas. For more information, visit [www.kansasforests.org/programs/streamside/benefits.shtml](http://www.kansasforests.org/programs/streamside/benefits.shtml). But we all have a part to play in protecting our water and there are many things we can do in our homes and schools to make sure we have clean, fresh water in our state.

### **Kansas Case Study**

Wyandotte High School teacher, Dr. Mike Hotz, explains how their project has made the most of the water resources in their community to impact their Kansas Green School.

*We are in our third year of an interdisciplinary project centered around water education. The project is being carried out by the Global Engineering and Technology Small Learning Community and the Green Team of Wyandotte High School in the Kansas City Kansas Public School District USD 500. It is a cross curricular project with Math, Science, Social Studies, English, and Engineering classes.*

*What is a Watershed? is explored. After viewing the EPA video "After the Storm" we bring the topic back to the local level of where our water comes from and what we can do to improve the watershed because we all "Live down stream". Project WET and Project Learning Tree activities are used to educate students to the fact that we are the Blue Planet and the importance of water. How much of the earth is made up of water and what percentage is usable is emphasized. This leads to water usage and the importance of using it wisely.*



*We have teamed up with Blue River Water Association and the U.S. Green Building Council in receiving an Earth Force Grant. Water testing instruction is conducted by the BRWA and a field experience of testing water from the Missouri and Kansas Rivers, at KAW Point in Kansas City, Kansas, was done. KAW Point is where the Kansas River flows into the Missouri and is a major historical point where Lewis and Clark stopped off. After seeing and working with the rivers we come back to what can we do. We search the school site for problem areas. Two areas that have been identified on our site are erosion and trash.*

*If you go to Google Earth and look at the area between our two parking lots you can see the evidence of erosion from run off of the one parking lot draining into the other. The deterioration of our curbs is no*

*longer diverting water into the proper drainage areas. What a great opportunity to learn about and build rain gardens. This will be a major project to learn about, design and build for our students. As we were out investigating, it became evident that trash on our parking lots and streets will flow into storm drains and eventually the rivers, which becomes another project. Cleaning up and preventing litter on our site and other areas will become another major project. We will be doing storm drain education with the Storm Drain Department of Wyandotte County and helping them stencil and mark storm drains in our area and other parts of town.*

*Field experiences to other urban lakes in Kansas City, Missouri and Johnson County, Kansas have been taken. We compare the urban lakes with a well-planned suburban lake (Kill Creek Park) where a park and lake has been planned around a former ammunitions plant and housing developments are just now starting in this area. We join with the EPA, KU and engineering firms to give students first hand experiences with professionals in the field of Environmental Education. We use these opportunities to emphasize college and careers in the environmental science areas.*



*As we study the different cycles related to water we are incorporating the education, building, and monitoring of an aquaponics system in our greenhouse with the plan of sustainability for individuals and neighborhood garden sites. Students will also apply to teach and mentor elementary students after school this spring about environmental topics. Our Art Department will be painting rain barrels that we will raffle off at our Green Day in April. KACEE has been a major resource for education of our teachers and has provided grant money to finance these projects.*

## **Water Glossary**

The following definition may be helpful in completing the Water Investigation.

**Aquifer-** An aquifer is a body of saturated rock through which water can easily move.

**Groundwater-** Groundwater is the water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations.

**Watershed-** A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place.

<https://oceanservice.noaa.gov/facts/watershed.html>

### Did You Know?

One of the world's largest aquifers, the Ogallala aquifer, is located in Kansas and seven other states. The aquifer system supplies drinking water to 82 percent of the 2.3 million people (1990 census) who live within the boundaries of the High Plains study area.

## Why is Connecting Our Kids to Nature and Environmental Education Important?

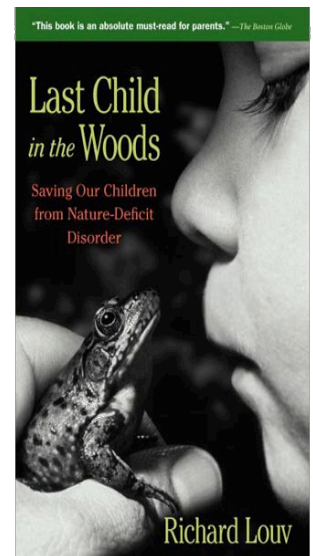
Here are some statistics about the average child in the United States.

- In 2004, American children spent less than half as much time outdoors as their parents. (Kaiser Family Foundation, 2005).
- Kids are reported to spend 7.5 hours per day on electronic equipment during their free time. (Kaiser Family Foundation, 2010).
- A longitudinal study found that children under 13 living in the United States spend on average only about half an hour of unstructured time outdoors each week (Hofferth & Sadberg, 2001).

In 2005, **Richard Louv** coined the term, "Nature Deficit Disorder" in his book, "***Last Child in the Woods.***" This term was used to define the potential impacts on children of spending less time outdoors.

*Louv states, "Nature-deficit disorder is not an official diagnosis but a way of viewing the problem, and describes the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties, and higher rates of physical and emotional illnesses. The disorder can be detected in individuals, families, and communities" (Louv, 2005).*

The reduced contact children are having with nature is leading to a rise in many emotional, mental and physical health risks. Some examples in his book are a rise in childhood ADHD, correlation with rises in childhood obesity and negative impacts on cognitive and conceptual development.



## How Does Nature and Environmental Education Help Our Students?

Numerous studies have shown that environmental education has many benefits to children.



- **Science Scores-** Numerous studies have shown that environmental education boosts science scores.
- **Physical Health-** Physical activity is shown to improve children’s health, and a growing body of evidence suggests that exposure to natural environments can improve attention & decrease stress in children. (McCurdy et. Al, 2010)
- **Increased Focus/Improved Cognition -** Wells observed that proximity to nature, access to views of nature, and daily exposure to natural settings increases the ability of children to focus and improves cognitive abilities. (Wells, 2000)
- **Behavioral Management-** Taylor and her colleagues found that children with attention-deficit disorder (ADD) benefited from more exposure to nature –the greener a child’s everyday environment, the **more manageable are the symptoms of ADD.** (Taylor, 2001)
- **Emotional Health-** Taylor also observed that access to green spaces for learning and play, and even having views of green settings, **enhances peace, self-control, and self-discipline** among inner-city youth, especially among girls.
- **Group Cohesion/Increased Creativity-** At the school environment level Bell and Dymont observed that children who experience school grounds or play areas with diverse natural settings are **more physically active, more aware of good nutrition, more creative, and more civil to one another.** (Bell & Dymont, 2006)
- **Community Involvement-** Getting students involved in recycling projects, composting, community swap days and waste education can promote stronger social ties to the community.

## Water Education Resources

Many organizations provide educational resources related to water. See the **Resources** section in Part 5 for a list of organizations that provide curricula, professional development and more.

## Educational Opportunities for Teachers

KACEE provides professional learning opportunities for educators across the state with the option to attain one hour of college credit for participating courses. For a current opportunity schedule and learn about the eeCredential Program, visit <https://www.kacee.org/eecredentials>.

## Home Connection

The results of this investigation will show students how they can make a variety of improvements to their school’s water quality and conservation efforts. Many of the ideas they



generate can also be used at home. See page 31 for a **Home Connection** chart that can be distributed or made available on school websites for families to download and use.

## Part 3: Water Investigation Materials

### Directions for Green Team Leaders

There are five areas you might want to investigate as a part of becoming a Kansas Green School of Excellence. These areas include:

- 1) **Energy-** This investigation will help your team identify current energy management practices and will help in thinking of ways to modify these practices to make your school greener and healthier! Your results will inform school staff and students where they can make improvements and also to generate an action plan to reduce school energy use.
- 2) **Waste and Recycling-** This investigation will help your team identify current waste management practices and will help in thinking of ways to modify these practices to make your school greener and healthier! Your results will inform school staff and students where they can make improvements and also to generate an action plan to reduce school waste.
- 3) **Water-** This investigation will help your team identify water practices and will help to identify ways in which your school can conserve water! Your results will inform school staff and students where they can make improvements and also to generate an action plan to improve water efficiency, improve water quality and create conservation ideas for students and staff.
- 4) **Healthy School Environments-** This investigation will help your team identify air quality and transportation management practices and will help in thinking of ways to modify these practices to make your school greener and healthier! Your results will inform school staff and students where they can make improvements and also to generate an action plan to improve school health for students and staff.
- 5) **The Learning Community-** This investigation will help your team identify improvements for your school grounds, and ideas to help local wildlife, flora and fauna, the school community, and your neighborhood, city, state, country and

world. Your results will inform school staff and students where they can make improvements and to also generate an action plan.

## Getting Ready to Begin the Investigation

**Step 1. Identify Leaders-** Identify one or more Green Team Leaders to be in charge of the Water Investigation.

**Step 2. Obtain Permissions-** Leaders will want to obtain the necessary permissions from schools administrators before starting the investigation. They should decide how and when the investigation will be conducted to avoid conflicts with school classes and activities.

**Step 3. Form Your Green Team-** Leaders should decide who will be conducting the investigation. A team approach is recommended. The more diverse the representation on your Green Team, including students and their grade levels, members of the community, etc. the higher the Globe Level you can apply for. Consider including the following representatives:

- Teachers
- Students
- Administrative staff members
- Custodial and maintenance staff members
- Cafeteria staff members
- Parent/Grandparent volunteers
- Resource Professionals in the community

**Step 4. Develop Questions for Discussion** - Before you begin, gather your KGS Green Team and come up with a list of items and/or questions you have regarding your school's energy use, waste practices, water quality and usage, school grounds and overall environmental quality. Be sure to add on any items/questions you have that are not included in the KGS's Investigations.

**Step 5. Develop a Schedule and Assign Roles-** Discuss how team members are going to conduct the investigation. Will the team always work together, or will the team split into groups and assign sections to each group? Are specific school staff members (custodial, maintenance, administrative) needed during certain parts of the investigation? If so, contact them to schedule a time for that part of the investigation. Develop a schedule for how the team will conduct the investigation.

**Step 6. Print the Investigation-** Provide a printed copy of the entire investigation to the Green Team members who will be conducting the investigation. Then, they can record information as they walk around the school and complete the investigation. Encourage team members to answer the questions to the best of their ability according to time allotted and documents and materials available to them. The **“Teacher Print Out Packet”** contains the **Individual Classroom and School Wide Water Usage Charts** to record information on and are available for distribution throughout your school faculty. The Print Out Packet is available on the KGS Website under the Investigation you are completing.

Add any questions that your Green Team discussed that were not covered in the investigation.

**Step 7. Gather Documents and Supplies-** If possible, gather the following documents and supplies before the team begins the Investigation:

- Monthly and/or Annual Billing Statements for Water Service;
- Any written policies related to water management and conservation;
- Stop watch or second hand on a watch;
- Copies from the **“Teacher Print Out Packet”** for the investigation that’s on the KGS Website under the Water Investigation;
- Graduated cylinders (if needed for any further investigations).

**Step 8. Conduct the Investigation-** Green Team should answer the questions to the best of their ability within the time allotted, and with the information and equipment available.

**Step 9. Develop and Implement an Action Plan-** Based on the information and data collected, the Green Team will prioritize their ideas for action projects and implement one or more of their plans.



**Step 10. Apply for Recognition-** Once your investigation and action plans are complete, you will apply for a Silver, Gold, or Gold Globe Level of Recognition. Rubrics on how each level will be scored along with the applications are available on the KGS website. Visit <http://www.kansasgreenschools.org/apply-recognition> for more information.

**Step 11. Celebrate Your School's Success-** Communicate your school's findings and action plans with the school, school administrators, families, the community and your representatives!

## Part 4: Water Investigation



### Plunge Into Water Investigation!



#### Introduction

How is water used in your school? Are there ways to make your school water use more efficient? This investigation will help your team identify water practices and will help to identify ways in which your school can conserve water! Your results will inform school staff and students where they can make improvements and also to generate an action plan to improve water efficiency, improve water quality and create water conservation ideas for students, staff and their families.

#### Objectives

- Students will investigate the water usage in their school.
- Student will identify any water inefficiencies.
- Students will record and analyze water data.

#### Time Requirement

The "Classroom Water Survey" will take approximately 30 minutes to complete per classroom. The "School-Wide Water Investigation" will take several 45-minute sessions to complete, depending on the documentation available, equipment being used, and help from supporting school staff. Be sure to gather all of the needed supplies.

#### Documents and Supplies

- Monthly and/or Annual Billing Statements for water service.
- Any written policies related to water management and conservation.
- Stop watch or second hand on wrist watch.
- Graduated cylinders (if needed for any further investigations)
- Aerators (if needed for any further investigations)

**Plunge into Water Investigation Overview**

1. School Water Source
  1. What’s in Our Water?
  2. Where Does Our Water Go?
  3. How Does Water Help Us Stay Healthy?
  4. Water Usage and Our School
  5. How Do We Use Water in Our Classroom?
  6. How Do We Use Water in Our School?
  7. How Do We Use Water on Our School Grounds?
  8. Curriculum and Community
  9. Action Planning
    - School based recommendations

**School Water Assessment:**

Water is one of our most precious natural resources. We use it for drinking, cooking, washing, cleaning, irrigation, and more. It’s easy to waste water and take water for granted. Water pours out of our faucets as though it were endlessly available. But the truth is that the supply of good quality fresh water is limited. Fortunately, it’s just as easy to conserve water, as it is to waste it. This Water Assessment will help you identify current water use practices in your school, and start you thinking about how you can modify these practices to conserve water, improve water quality around your school and maintain public health.

**School Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Conducted By:**

**(Please include administrators, teachers, school staff, students, and parents involved in this investigation.)**

**Name Title/Role**

|       |       |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

---

---

---

---

---

---

**School Population**

Students: \_\_\_\_\_

Staff: \_\_\_\_\_

## Part 1: Where Does Our Water Come From?

When we turn on our faucets, water comes out, but where did that water come from? What process did it go through to end up at our school? Do we pay for water or is it free? Students will investigate these ideas as they learn more about the water in their school.

1. Investigate what the definition of a watershed is. In which watershed is your school located? You can use the following USGS website to locate your watershed:  
[https://water.usgs.gov/wsc/map\\_index.html](https://water.usgs.gov/wsc/map_index.html)
2. Is there a local watershed protection organization in place that works to protect the water resources in the watershed? Sources: [www.kswraps.org](http://www.kswraps.org) or call 785-296-4195 at the Kansas Department for Health and Environment in the Watershed Management Bureau of Water.  
 No  
 Yes- Name of Organization: \_\_\_\_\_
3. If yes, has a watershed protection plan been written for your watershed? See resources listed in question #2.  
 No  
 Yes
4. If yes, what are the most important issues addressed in the watershed plan?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
5. If your water comes from a lake, river, aquifer or reservoir, can you identify the land area that contributes runoff to the source? (This land area is called a watershed). What are people doing in that watershed that may potentially impact your water?  
\_\_\_\_\_
6. Based on where your water comes from, does it have a Source Water Protection Plan? Contact KDHE at 785-296-4195.  
 No

- Yes- What are the potential impairments to your drinking water?

---

---

---

7. What is the name and what is the approximate distance of the closest body of water to your school? (For example, stream, river, lake, aquifer). This is an opportunity to use Google Earth.
8. What is the source of your school's water supply?
- School has own well
  - Municipal water supply
  - Rural water supply
9. If your water comes from a rural or municipal supply, what is its source?
- Groundwater (well, aquifer)
  - Surface water (lake, river, reservoir)
10. If your water comes from a rural or municipal supply, what did your school pay last year for water?
- \$ \_\_\_\_\_
11. How much does the water company charge per unit of water?
- \$ \_\_\_\_\_ per \_\_\_\_\_
12. Based on water bills or in-school meters, how much water did your school use last year? (1 cubic foot = 7.48 gallons; provide both)
- \_\_\_\_\_ gallons
- \_\_\_\_\_ cubic feet

## Part 2: What's In Our Water?

The questions in this section ask about water quality at your school. To answer them, you may need the assistance of the school custodian or facility manager or contacting your local water supplier.

1. Where does your school drinking water come from (i.e. who is supplier)? \_\_\_\_\_
2. Who is monitoring its water quality and how often is it tested?
3. Who monitors and samples the "raw" (before treatment) water from your water source? How often is the water quality tested?

---



4. If your water comes from a municipal supply, a water quality report should be available to the public. The reports are often mailed to customers and available at the supplier's website. If your school has a private well, check with the school administration for water quality data.

Chemical Contaminants

- Yes
- No

Bacteria

- Yes
- No

**Water Quality Reports:** Water supplier contact information and some water quality reports may be found at: <http://cfpub.epa.gov/safewater/ccr/index.cfm> . Water reports may also be available online at your municipality's site. If it's not available online, pick a town close by to you or call your municipality for a report.

**School Water Sample:** Find out what contaminants are sampled and list them below. A few examples of possible contaminants are provided on the chart. (Note: some contaminants are added to water as a byproduct of the treatment process).

| Contaminant             | Was any detected?<br>Yes/No | Was the action level set for the contaminant exceeded, causing a violation?<br>Yes/No |
|-------------------------|-----------------------------|---|
| E. Coli bacteria        |                             |   |
| Coliform bacteria       |                             |   |
| Arsenic                 |                             |   |
| Chromium                |                             |   |
| Copper                  |                             |   |
| Cyanide                 |                             |   |
| Fluoride                |                             |   |
| Lead                    |                             |   |
| Selenium                |                             |   |
| Nitrites                |                             |   |
| Phosphorous             |                             |   |
| Nitrates                |                             |   |
| Barium                  |                             |   |
| Cadmium                 |                             |   |
| Disinfection by product |                             |   |
| Others:                 |                             |   |
|                         |                             |   |

4. If there are contaminants in your drinking water, what are their likely sources?
- Naturally occurring
  - Agriculture
  - Urban runoff
  - Others: \_\_\_\_\_
5. Does your water contain fluoride?
- Yes
  - No
6. If no, does your school have a fluoride rinse or tablet program?
- Yes
  - No
7. Is all ice used for consumption made only from drinking water?
- Yes
  - No
8. How is your water treated at the water treatment plant before it is delivered to your school to make sure it is safe to drink? (Information available through your municipality).
- Chlorine added to kill bacteria
  - Activated carbon filtration
  - Settled and precipitated to remove sediment and other material
  - Aeration
  - Other: \_\_\_\_\_

### Part 3: Where Does Our Water Go?

1. Where does all the water in Kansas eventually drain?  
Using River Runner, take a bird's eye tour of your watershed. When water runs off of your your school grounds, where does it go? Is there a nearby creek or river? (You could observe using Google Earth). Also, if your water comes from a river, find the beginning of your river and follow it to where it ends. Visit <https://river-runner.samlearner.com/>
2. Where does wastewater used in your school go?
- On-site septic system and drainage field
  - Holding tank
  - Municipal sewer system.
- Name: \_\_\_\_\_

3. If your wastewater goes to the Municipal sewer system, have any classrooms made a field trip to the site?  
 Yes  
 No
4. Does your school have a plan to deal with chemical spills that may travel down floor drains into the public sewer system?  
 Yes  
 No

### Part 4: How Does Water Help Us Stay Healthy?

1. Does your school have a program to encourage frequent hand washing?  
 Yes  
 No
2. Does your school have time built into the schedule for washing hands prior to food consumption?  
 Yes  
 No
3. Does your school maintain adequate supplies for hand washing?  
 Yes  
 No
4. What are the advantages and disadvantages of using soap and water versus hand sanitizer?

### Part 5: Water Usage and Our School

How do we use water in our school? Take a tour of your school to investigate the following questions.

**NOTE:** To have more accurate data, you may want to do these investigations multiple times and average your results.

1. On average, how much water do the school's toilets use per flush? (on many toilets, this is listed behind the seat of the toilet lid or ask school maintenance staff for help to find this information).  
 >3 gallons  
 2-3 gallons  
 1-2 gallons  
 <1 gallon

2. How many hot water heaters does your school have?  
\_\_\_\_\_ Number
  
3. What type(s) of energy is used to heat the school's hot water?
  - Natural gas
  - Propane
  - Electricity
  - Other: \_\_\_\_\_
  
4. Are there any booster heaters located near appliances that use a lot of hot water?
  - Yes
  - No
  
5. Does your school have any "on demand" hot water systems (in which water is heated as it is being used, rather than stored hot)?
  - Yes
  - No
  
6. If yes, where are they located?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  
7. Are there any re-circulation pumps for rooms that are located a long distance from the water heater?
  - Yes
  - No
  
8. Does your school have a swimming pool?
  - Yes
  - No
  
9. If you answered yes, is a pool cover used?  
(Important because pool covers limit evaporation)
  - Yes
  - No
  
10. How many gallons of water does it take to fill the pool?

Since every square foot that is one foot deep can hold 7.5 gallons, you can use the following equation to figure out how many gallons of water it takes to fill your school's pool:

Length (in feet) X Width X Average Depth X 7.5 = \_\_\_\_\_ gallons of water to fill the pool

11. How often is the water changed? \_\_\_\_\_

12. Does your school have a cooling tower?

*Cooling Towers are usually found outside or on the roof next to the Chiller (HVAC) Room. Cooling towers extract heat from water that has been used to cool the building.*

- Yes  
 No

**Did you know? A steadily dripping faucet can waste 2000 gallons per year.**

## Part 6: How Do We Use Water in Our Classrooms?

Recruit classrooms to help you investigate how individual classrooms use water and how that adds up for the overall school's water usage. For each classroom participating, you will need to give them the **Water Use by Classroom** worksheet below.

**Water Use by Classroom-** Complete the chart as you investigate water-using devices in classrooms. Add rows if needed in order to collect information on all the classrooms.

**These notations are used in the Sample Water Investigation:**

**A= Automatic:** equipment that must be turned on manually but turns off automatically or on a timer.

**S= Sensors:** equipment that turns on and off based on movement of person using the equipment.

**M= Manual:** Equipment that must be physically turned on and off by user.

**Directions:** In the "Total Number" column, write in the number of each device found at that location and indicate with an "A" "S" or "M" if the device uses Automatic, Sensor, or Manual equipment to operate. In the "# Leaking" column, indicate the numbers that are leaking/dripping.

**\*To calculate the amount of water wasted per unit time:** Time how long it takes for a set volume of water to drip into a beaker, and then calculate how much water is wasted per day due to this drip.

**\*Use the "Water Use by Classroom" chart from below if the classrooms in your school have sinks, water fountains or bathrooms. Compile the data from the "Water Use by Classroom" chart and insert the totals on the above School Wide water use chart.**

**Be creative in all the ways you can monitor water usage in your school.  
Remember, every drop counts!**



**Water Use by Classroom**

Turn into \_\_\_\_\_ by \_\_\_\_\_.

Date of Investigation: \_\_\_\_\_

| Teacher Name: |                     |           |                     |           | Room #:             |           |                     |           |                     |           |
|---------------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
| Location      | Faucets             |           | Water Fountains     |           | Toilets             |           | Drinking Fountains  |           | Other               |           |
|               | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking |
| Bathroom 1    |                     |           |                     |           |                     |           |                     |           |                     |           |
| Bathroom 2    |                     |           |                     |           |                     |           |                     |           |                     |           |
| Sink          |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |

**Water Use by Classroom**

Turn into \_\_\_\_\_ by \_\_\_\_\_.

Date of Investigation: \_\_\_\_\_

| Teacher Name: |                     |           |                     |           | Room #:             |           |                     |           |                     |           |
|---------------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|---------------------|-----------|
| Location      | Faucets             |           | Water Fountains     |           | Toilets             |           | Drinking Fountains  |           | Other               |           |
|               | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking | Total Number/ A-S-M | # Leaking |
| Bathroom 1    |                     |           |                     |           |                     |           |                     |           |                     |           |
| Bathroom 2    |                     |           |                     |           |                     |           |                     |           |                     |           |
| Sink          |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |
| Other:        |                     |           |                     |           |                     |           |                     |           |                     |           |

## Part 7: How Do We Use Water in Our School?

**School Wide Water Use-** Complete the School-Wide Water Use Chart as you investigate water-using devices throughout the school building. Add rows if needed in order to collect information on all the rooms in your school building. Collect the **Water Use by Classroom** charts to complete filling in your school-wide investigation.

### These notations are used in the Sample Water Investigation:

**A= Automatic:** equipment that must be turned on manually but turns off automatically or on a timer.

**S= Sensors:** equipment that turns on and off based on movement of person using the equipment.

**M= Manual:** Equipment that must be physically turned on and off by user.

**Directions:** In the “Total Number” column, write in the number of each device found at that location and indicate with an “A” “S” or “M” if the device uses Automatic, Sensor, or Manual equipment to operate. In the “# Leaking” column, indicate the number that are leaking/dripping.

**\*To calculate the amount of water wasted per unit time:** Time how long it takes for a set volume of water to drip into a beaker, and then calculate how much water is wasted per day due to this drip.

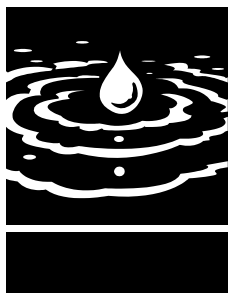
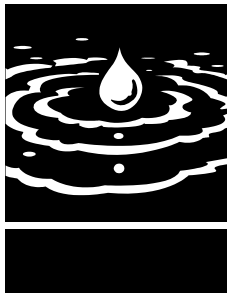
### Student Driven Inquiry:

- 1) In what ways could you figure out how much water the school uses in a year’s worth of hand washing? What equipment would you need?
- 2) If your school operates a sprinkler system, how might you determine how much water per hour is used each time the sprinkler system is turned on?

NOTE: Try Project WET Activities, *Money Down the Drain* and *My Water Footprint*.

**Inquiry on Aerators: What is an Aerator?** An aerator is easily installed and instead of water flowing out in one big stream, an aerator spreads this stream into many little droplets saving water and reducing water splashes.

- 3) If aerators were installed, how much water can be saved each year by using aerators on all classroom faucets? How could you set up an investigation to show how much water was saved?



### School-Wide Water Use Chart

| Location     | Faucets                |           | Water Fountains        |           | Toilets                |           | Drinking Fountains     |           | Other                  |           |
|--------------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|
|              | Total Number/<br>A-S-M | # Leaking | Total Number/<br>A-S-M | # Leaking | Total Number/<br>A-S-M | # Leaking | Total Number/<br>A-S-M | # Leaking | Total Number/<br>A-S-M | # Leaking |
| Bathroom 1   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 2   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 3   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 4   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 5   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 6   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Bathroom 7   |                        |           |                        |           |                        |           |                        |           |                        |           |
| Hallways     |                        |           |                        |           |                        |           |                        |           |                        |           |
| Cafeteria    |                        |           |                        |           |                        |           |                        |           |                        |           |
| Gym          |                        |           |                        |           |                        |           |                        |           |                        |           |
| Office       |                        |           |                        |           |                        |           |                        |           |                        |           |
| Class-rooms* |                        |           |                        |           |                        |           |                        |           |                        |           |
| Other:       |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |
|              |                        |           |                        |           |                        |           |                        |           |                        |           |



## Part 8: How Do We Use Water on Our School Grounds?

1. How many water faucets are located outside of the school building? \_\_\_\_\_
2. How many of those are leaking? \_\_\_\_\_
3. How many have been secured so that only school staff may turn them on or off?  
\_\_\_\_\_
4. Does school staff use hoses to wash sidewalks and parking areas?  
 Yes  
 No  
If yes, what are some alternatives that could save water?  
\_\_\_\_\_
5. Does your school building have gutters and/or down spouts?  
 Yes  
 No
6. If yes, is this water collected and reused?  
 Yes  
 No  
If so, how is the water collected and used?  
\_\_\_\_\_  
\_\_\_\_\_
7. Where does water that runs off the school's roof, parking lots and grounds go?  
(Check all that apply)  
 Storm drain  
 Recessed grassy areas  
 Rain garden  
 Retention pond  
 Drainage ditch  
 Natural pond, stream or wetland  
 Rain barrel
8. How many water meters are there at the school? \_\_\_\_\_  
(Water meters measure and record the amount of water flowing through them at any moment. They may be found buried outside the building or indoors where the water line comes into the building).

9. Do the meters record water used both indoors and outdoors?

- Yes  
 No

10. If yes, what do you think is the ratio of water used both indoors and outdoors?

\_\_\_\_\_

11. Does your school have a plan for managing and reducing runoff from school grounds?

- No  
 Yes, please describe:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. Are lawns and athletic fields managed in a way that conserves water? (For example; if fields must be watered, is this done during the cooler parts of the day to minimize evaporation loss? Are drinking fountains turned off when not in use?)

- Yes  
 No

13. Does your school have any outdoor fountains or artificial waterfalls?

- Yes  
 No

14. If yes, answer the following:

a. Are they turned off in the evening?

- Yes  
 No

b. Are they turned off in very hot weather?

- Yes  
 No

c. Do they re-circulate water?

- Yes  
 No

d. Who maintains them? \_\_\_\_\_

## Part 9: Curriculum and Community

To answer the following questions, you may want to interview the staff who manages the school's environmental policies and teacher training. Information on academic standards may be available on school websites.

1. Does your school's academic standards include water conservation?

Yes

No

If yes, in what grades is it taught? \_\_\_\_\_

2. Has your school staff participated in any training programs/workshops that include water education?

Yes

No

3. Does your school participate in any water projects that benefit the community, for example erosion control through plantings, stream cleanup, or water monitoring?

Yes

No

If yes, what are they? \_\_\_\_\_

4. Some water management facilities can be used as educational resources. Which are found in your community?

Pumping station Yes \_\_\_ No \_\_\_ Location: \_\_\_\_\_

Drinking water treatment plant Yes \_\_\_ No \_\_\_ Location: \_\_\_\_\_

Water tower Yes \_\_\_ No \_\_\_ Location: \_\_\_\_\_

Wastewater treatment plant Yes \_\_\_ No \_\_\_ Location: \_\_\_\_\_

5. Has your school/class ever toured any of these facilities?

Yes

No

6. Are students and staff encouraged to conserve water?

Yes

No

If yes, briefly explain how:

---

---

---

---

7. Does your school website and/or other media outlets, such as newsletters, emphasize the school's water conservation goals or programs?

- Yes  
 No

8. Are School Fundraising Car Washes held in your community? If yes, briefly explain how and where:

---

---

---

---

9. What kind of soap do you use for the car washes? \_\_\_\_\_

**Did You Know?** Washing cars in driveways/parking lots is one of the most environmentally un-friendly chores we can do. Unlike household waste water that enters sewers or septic systems and undergoes treatment before it is discharged into the environment, what runs off from your car goes right into storm drains -- and eventually into rivers, streams, creeks and wetlands where it poisons aquatic life and wreaks other ecosystem havoc.

On the other hand, federal laws require commercial carwash facilities to drain their wastewater into sewer systems, so it gets treated before it is discharged back into the outdoors. According to one report, washing a car at home typically uses between 80 and 140 gallons of water, while a commercial car wash averages less than 45 gallons per car.

It is better to avoid the driveway and instead wash your car on your lawn or over dirt so that the toxic waste water can be absorbed and neutralized in soil instead of flowing directly into storm drains or open water bodies. Biodegradable car wash soaps are available as well as waterless soaps.

This information can be helpful to your action planning if school fundraiser ideas include car washes. They might consider selling tickets redeemable at local car washes, enabling the organizations to still make money while keeping dry and keeping local waterways clean.

## Part 10: Action Planning

Based on the information you found out from this investigation, what recommendations do you have to help conserve water and improve the water quality around your school?

Explore the data you have collected from the classrooms and the school. It may be helpful to combine data into over all totals to help your Green Team analyze your data.

Based on the information you found out from this investigation, what recommendations do you have for the school to improve the water usage?

**Calculations:**

- Using the School-Wide Water Use chart, how many faucets are leaking out of the total number of faucets? \_\_\_\_\_
- What percentage is this? \_\_\_\_\_
- Using the School-Wide Water Use chart, how many toilets are leaking out of the total number of toilets? \_\_\_\_\_
- What percentage is this? \_\_\_\_\_

NOTE: If you only collected data on one day, you may want to repeat your data samples on multiple days to get more accurate results. You may also want to conduct periodic classroom and school wide water investigations to chart your schools progress.

What additional information from your investigation did you find that might have implications for your action plan:

---

---

---

---

---

To develop your action plan, consider the following questions:

- What are your school’s goals to improve its overall water usage?
- What are the potential economic benefits of reducing your school’s water usage?
- How can you engage the broader school and community in setting goals?
- What are some potential strategies you might use to address those areas where your Green Team would like to make improvements?
- What resources (including funding) will your school need to implement strategies and where might your school obtain these resources?
- How can you engage students, school personnel, parents and community in helping to develop and implement these strategies?
- How can you encourage students to support your school’s goals at home?

The following template may be helpful to create an action plan for success!

| <b>School Water Use Action Plan</b> |                  |  |          | Date:  |
|-------------------------------------|------------------|--|----------|--|
| School Name:                        |                  |  |          |  |
| School Goal:                        |                  |  |          |  |
| Strategies                          | Resources Needed | Persons Responsible or Persons Needed to Recruit | Timeline | How will you measure, communicate and celebrate success? |
|                                     |                  |  |          |  |
|                                     |                  |  |          |  |
|                                     |                  |  |          |  |
|                                     |                  |  |          |  |
|                                     |                  |  |          |  |

# Home Connections



Family Name:  
Total Number of People in My Household:  
Dates of Investigation:

| Types of Water Usage per Day      | A<br>Number of Water Usages      | B<br>Average time of Water Usage | C<br>Total Water Usage Time (A x B) | D<br>Number of Gallons per Minute for the Water Use Activity | Total Gallons of Water Used (C x D) | Ways to Make Improvements   |
|-----------------------------------|----------------------------------|----------------------------------|-------------------------------------|--|-------------------------------------|---|
| Example for a Family of 4: Shower | 4 Showers<br>1 per family member | 10 Minutes                       | 40 Minutes                          | 7 Gallons/minute   | 280 Gallons                         | Use shower timers for shorter showers. Use a water saving showerhead. |
| Showers                           |                                  |                                  |                                     |  |                                     |   |
| Baths                             |                                  |                                  |                                     |  |                                     |   |
| Toilet Flushing                   |                                  |                                  |                                     |  |                                     |   |
| Dishwasher                        |                                  |                                  |                                     |  |                                     |   |
| Load of Laundry                   |                                  |                                  |                                     |  |                                     |   |
| Brushing teeth                    |                                  |                                  |                                     |  |                                     |   |
| Hand washing dishes               |                                  |                                  |                                     |  |                                     |   |
| Watering the Lawn/Garden          |                                  |                                  |                                     |  |                                     |   |
| Other Uses:                       |                                  |                                  |                                     |  |                                     |   |

### Average Gallons of Water Used per Activity

Shower: 7 gallons/minute

Bath: 32 gallons/tub

Running Faucet: 3 gallons/minute

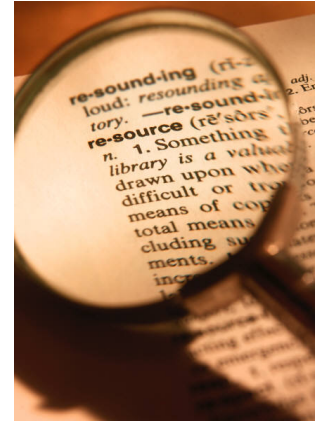
Washing Machine: 45 gallons/load

Dishwasher: 15 gallons/load

Watering the Lawn: 7 gallons/minute

Toilet flush: 6 gallons/flush or 1.6 if new toilet

## Part 5: Resources



### General Links

- Contact the Kansas Association for Conservation and Environmental Education (KACEE at [www.kacee.org](http://www.kacee.org)) for local resource contacts.
- Kansas Green Schools for resources and contacts with other schools in the state ([www.kansasgreenschools.org](http://www.kansasgreenschools.org))

### Water Links

- [www.discoverwater.org](http://www.discoverwater.org) Interactive learning site for students on the water cycle, oceans, watersheds, healthy hand washing habits and more.
- <https://www3.epa.gov/safewater/kids/other.html> This U.S. EPA website provides water education resources for teachers of grades K-12, as well as water games and activities for students in grades K-12.
- <http://www.safewater.org> The Safe Drinking Water Foundation has hands-on drinking water kits and additional teaching resources that relate content to science, social studies, and math, thereby investigation the topic from various perspectives including economics, social issues and health issues.
- <https://www.usgs.gov/special-topic/water-science-school> This U.S. Geological Survey's (USGS) Water Science for Schools website offers information on many aspects of water, along with pictures, data, maps, and an interactive center where you can give opinions and test your water knowledge.
- <http://www.watereducation.org> The Water Education Foundation has a site for students. The mission of the Water Education Foundation is to create a better understanding of water issues and to help resolve water resource problems through educational programs.
- <http://www.h2ouse.org> Take the tour to investigate the water saving opportunities in each area of your home. Click on each location to show both the facts and some specific advice.



## Part 6: Curriculum Connections

### Project Learning Tree Curriculum Connections- Water

Project Learning Tree (PLT) has a variety of environmental education curriculum materials that support and enhance the Kansas Green Schools “Plunging Into Water” Investigation. Educators may want to conduct one or more of the following PLT activities to prepare students for the investigation. Through these activities, students will learn water terminology, why it is important to conserve water and how to improve water quality at school and at home.

#### Preschool – 8th Grade- PLT’s PreK-8 Environmental Education Guide:

##### **#14 Renewable or Not?**

Students often do not know which resources are renewable and which are nonrenewable, or which are recyclable or reusable. In this activity, students will learn what those terms mean and will discover why sustainable use of natural resources is so important.

##### **#36 Pollution Search**

Here’s a way for your students to take a closer look at pollution: what it is, what its sources are, and what people can do to reduce it.

##### **#38 Every Drop Counts**

It’s easy to waste water and even easier to take water for granted. Water pours out of our faucets as though it were endlessly available. But the truth is that the supply of good quality fresh water is limited. Fortunately, it’s just as easy to conserve water, as it is to waste it. This activity will help your class (and maybe the whole school) cut back on water waste.

##### **#44 Water Wonders**

The water cycle is the system by which Earth’s fixed amount of water is collected, purified, and distributed from the environment to living things and back to the environment. Through a game and an experiment, this activity will introduce students to the various steps of the water cycle and will help them make connections between the water cycle and all living things.

##### **#48 Field, Forest and Stream**

In this inquiry-based activity, students will conduct a field study of three different environments as they focus on sunlight, soil moisture, temperature, wind, water flow, plants and animals in each environment. By comparing different environments, students will begin to consider how nonliving elements influence living elements in an ecosystem.

##### **#71 Watch on Wetlands**

If a duck can paddle in it, it’s a wetland. If a duck can waddle on it, it’s not. If only wetlands could be defined as simply as this, wetlands issues and legislation would be less muddy. In this inquiry-based activity, students will conduct field studies in a local wetland and will learn how land use decisions and legislation affect wetland areas.

##### **#96 Improve Your Place**

Students learn about the steps involved in developing a service learning project. They plan and conduct a project that focuses on making positive environmental changes in their community.

## **PLT Secondary Level Materials**

### ***Exploring Environmental Issues: Places We Live***

#### **#7 Far Reaching Decisions**

Students develop graphic organizers and creative presentations to illustrate how individual decisions can affect the local environment, as well as distant communities. Students also measure their own ecological footprint.

#### **#8 Regional Community Issues: The Ogallala Aquifer**

In this activity, students investigate a regional issue as they adopt the roles of shareholders and debate solutions to the depletion of North America's largest aquifer.

### ***Exploring Environmental Issue: Focus of Risk***

#### **Special Topic: Chlorine: Looking at Tradeoffs**

Many of the risks we take are "balanced" by the benefits they offer. Chlorine, which is used in many ways around the world, is an example of a substance whose use presents potential benefits and risks to human health and the environment. This activity helps students learn about chlorine and gives them an opportunity to consider the tradeoffs associated with a variety of its issues.

### ***Exploring Environmental Issues: Focus on Forests***

#### **#6 Forest to Faucet**

Students map the boundaries of their local watershed and determine their community's reliance on forests for water.

### ***Global Connections: Forests of the World***

#### **#8 Making Consumer Choices**

Using paper as an example, students will analyze the life cycle and consumption patterns of forest products, and they will identify the international dimensions of product use. Using their findings, they will then draw conclusions about consuming forest products in a way that is more intelligent and that takes into account the global consequences.