

# The K.A.W. Project (Kids About Water)

An Issues and Action Approach to  
Stormwater Education

Presented by



## Teacher Packet



# The Kansas River

The Kansas River, locally known as the Kaw, flows from Junction City to Kansas City through small farming communities, suburban developments, large cities and open pastures. The Kansas River serves over 800,000 Kansans with drinking water and helps to generate our electricity, it also nourishes our gardens and washes away our wastes. It shaped our landscape, built our soil and recharged our groundwater. There is no more important part of our environment than the Kansas River. Yet, many people never think twice about how their lives and work are connected to the river. Through education, we are hoping to increase the awareness of how valuable the Kansas River is to our everyday lives.



# Kids About Water (KAW) Project



Students from Lexington Trails Middle School testing water at a small pond on school property.

**The KAW Project** is a five-lesson water quality issues and actions curriculum that targets students in grades 6-12 classrooms and other education organizations. Each lesson is aligned with the Kansas Next Generation Science Standards. Prior to the KAW Project, students are given a survey to assess knowledge, attitudes, and behaviors concerning water quality issues and actions.

**Lesson 1- Introduction to Watersheds and BMPs:** Students learn about their local watersheds and identify the watershed in which their school is located. They participate in an activity that targets the “horizontal water cycle,” i.e. how stormwater, drinking water, waste water, and ground water are connected. Students identify how impervious surfaces, agricultural runoff, and other human activities contribute to water pollution problems and how these problems become issues. The concept of Best Management Practices (BMPs) is introduced and examples of how they are used to mitigate water quality issues are given.

**Lessons 2 and 3- Field Experiences:** Students participate in two days of hands-on, data-generating water quality lessons at a water site. Small groups of students rotate through a set of activities that include: non-chemical tests (air and water temperature, turbidity, conductivity and pH); chemical tests (phosphates, nitrates, coliform bacteria); dissolved oxygen; and seining and identifying macro invertebrates. Each activity includes a data collection component and all collection protocols are followed.

**Lesson 4- Data Analysis:** Data collected from each field activity is analyzed to determine the overall condition of the water site. Connections are made on how runoff volumes and stream flow might impact pollutant levels and how that, in turn, might impact the quality and quantity of macros (water quality indicators) found there. Based on the analyzed data, students generate a list of water quality problems and issues associated with the tested water and discuss appropriate BMPs that could be used to improve water quality.

## **Lesson 5- Issues and Actions (Problem Solving Strategies):**

The students have collected and analyzed data; Now What? Students produce a list of problems related to the water quality data collected in lessons 2 and 3. As a class, they will focus on the test results which generated the most concern. While working in small groups, they will create practical solutions to improve the water quality and develop an Action Plan to be implemented in their own school/ community. Best Management Practices will also be discussed and encouraged to impact the quality of water as one of our most valuable natural resources.



Dear Teachers,

We are very excited about visiting your classrooms soon, and wanted to take a minute to thank you for allowing us to present our Water Quality Educational program to your students.

The K.A.W. classes (Kids About Water) teaches students about their watershed, the water cycle, storm water runoff, the importance of clean water as a natural resource, the impacts people have on the environment, and much more. It is presented in five separate lessons; two of which include taking a trip to a nearby creek, river, stream, lake or pond. Here the students will perform actual tests to determine the water quality of that particular water source using HACH kits.



But that's not all! They will also get to collect and observe **Macroinvertebrates!** Some of your students may not even realize what amazing creatures live in the water beside frogs, toads and fish. The presence of certain macroinvertebrates can be used to determine the health of a stream or similar water source.

As you can see, it will be a very busy, fun-filled educational week. We are looking forward to seeing you soon. Please look through the Teacher Packet for additional information, some of which you may want to share with your parents. We have also included a few optional supplemental materials for you to use with your students if you wish to do so.

We are looking forward to seeing you soon! If you have any questions, please feel free to contact our Education Director, Laura Calwell.

Thank you,

Friends of the Kaw

Laura Calwell  
Education Director  
Friends of the Kaw  
913 963 3460  
[friendsofthekaw@gmail.com](mailto:friendsofthekaw@gmail.com)



# What Is A Watershed?

A **watershed** is an area of land that drains water to a common body such as a nearby creek, stream, river, lake or pond. A watershed is separated from other watersheds by land with higher points of elevation. In Kansas watersheds can be pretty big since the land is not mountainous. But even in Kansas there are highlands and lowlands, and these create watersheds. Since watersheds have higher ground all around them, any water that falls anywhere within the watershed flows to the same low point- like the Kansas River, which is the low point in the Kansas River Watershed. We all live in a watershed!



## Why is it Important to Learn About Your Watershed?

Think about what happens to water when it rains. The raindrops may end up on plants, soil, lawns, rooftops, or pavement. Some of the rain is absorbed by the plants and may later evaporate back into the atmosphere. Some will soak into the soil and may end up as groundwater. Some may even run off the ground into a storm drain, and into a particular waterway such as a stream, river or lake. The bodies of water to which they drain are resources and need protecting.

Each time it rains, the rainwater travels downward, collecting debris along the way. This debris can be in the form of trash, leaves, car oil, road salts and other pollutants. Water pollution within a watershed can be identified as the overabundance of one or more natural or human-made substances in water. There are two major types; **Point** and **Non-point pollution**.

**Point Source Pollution** can be traced to a single source, such as a pipe, culvert, or ditch.

**Non-Point Pollution** comes from a much wider source and is not limited to a single outlet. Runoff from eroded fields, fertilizers, feedlots, and gasoline and oils from roads and parking lots, are a few examples.

Our rivers and lakes are used as sources of drinking water, recreation, wildlife habitats, irrigation and for industry. All organisms on Earth need water to live. If the land is misused or pollutants are spilled, the receiving stream will be effected. It is important to protect the lakes, rivers and watersheds to preserve the water quality that we depend upon.

### Point Source Pollution



- Point source pollution - The release of pollutants from a single, clearly identifiable site; for example, a factory chimney or the waste disposal pipe of a factory into a river.
- More easily managed because its impact is more localized and easier to control.

### Where is the

### Non-Point Source Pollution



- Non-point source pollution - The release of pollutants from numerous, widely dispersed origins; for example, gases from the exhaust systems of vehicles.
- Difficult to isolate and correct.

## Kansas River Watershed?

The Kansas River begins where the Republican and Smoky Hill Rivers join together at Junction City. It flows 171 miles to Kansas City where it ends by joining the Missouri River. The entire Kansas River Watershed includes the watersheds of the Republican and Smoky Hill Rivers, which means that the Kansas River Watershed drains almost the entire northern half of Kansas and part of Nebraska and Colorado. It is the world's longest prairie river. The green area on the Google Map below is the entire Kansas River Watershed—all 53,000 square miles!



A watershed can have smaller watersheds nested in it, just as streams flow into rivers. For example, the Smoky Hill and Republican Rivers are smaller rivers that flow into the Kansas River, so their watersheds are nested in the bigger Kansas River Watershed. The Delaware River flows into the Kansas River, and that's why the smaller Delaware River Watershed is also nested within the Kansas River Watershed. Same with Tuttle Creek.

## Best Management Practices

### *(Personal Actions to Improve Water Quality)*

Can you develop a plan to get your family, classmates, or neighbors to implement one of these practices?

**BEST MANAGEMENT PRACTICES**  
*(PERSONAL ACTIONS TO IMPROVE WATER QUALITY)*  
CAN YOU DEVELOP A PLAN TO GET YOUR FAMILY, CLASSMATES, OR NEIGHBORS TO IMPLEMENT ONE OF THESE PRACTICES?



The image displays ten distinct practices, each with a representative photograph and a caption below it:

- Install Rain Barrels:** A white rain barrel is attached to a downspout on a house.
- Plant Native Vegetation:** A collage of various colorful native plants and flowers.
- Dispose of Hazardous Waste Properly:** A person is shown pouring liquid waste into a blue hazardous waste container.
- Extend Downspouts to Grassy Areas:** A long, dark downspout extends from a roofline down to a grassy lawn.
- Plant Trees:** A group of people are working together to plant a tree in a yard.
- Apply Lawn Chemicals Properly:** A person is using a green backpack sprayer to apply chemicals to a lawn.
- Pick Up Pet Waste:** A person is kneeling on a lawn, picking up a pile of dog waste.
- Use a Commercial Car Wash:** A car is being washed by a blue automated car wash system.
- Stencil Storm Drains:** A person is using a stencil to apply a message to a storm drain cover.
- Plant a Rain Garden:** A landscaped garden bed with various plants and mulch, designed to capture runoff.

### What Can Be Done To Help Conserve and Protect Our Water?

- ✓ Take shorter showers.
- ✓ Turn water off while brushing your teeth.
- ✓ Install a low-flow shower head.
- ✓ Run the dishwasher only when it's full.
- ✓ Adjust water levels to size of laundry loads.
- ✓ Mulch to conserve soil moisture.
- ✓ Use Rain Barrels to capture water and use it to water plants in your yard.
- ✓ Build a Rain Garden to divert your gutter water into a beautiful planting bed.
- ✓ Use Eco-Friendly products for cleaning and pest control.
- ✓ Use low or No Phosphate soaps and detergents.
- ✓ Wash your car at the Car Wash.
- ✓ Pick up your pet waste in your yards, and while out walking.



Dear Parents,

Your child will be participating in a Water Quality Educational program presented by a non-profit organization called Friends of the Kaw. A staff member from Friends of the Kaw will be teaching about watersheds, storm water runoff, the importance of clean water as a natural resource, and especially the impacts people have on our environment, and water in particular.

The teacher might also be sending home a Survey/Inventory for your child to complete and return sometime during the next week. Our organization will use it to gather information and teach the students about possible chemicals and pollutants that may be entering our water without us even realizing it. It also allows us to teach about recycling, water conservation, native plants and more.

Our program is taught in five lessons, each one lasting 45-60 minutes.

The first session is an introduction to watersheds, storm water runoff, and detrimental effects of pollution on rivers, creeks, streams and lakes.

The second and third sessions provide opportunities for the students to visit a nearby creek, stream, river, lake or pond. The students will perform chemical and non-chemical tests on the water while working in their teams. They will also collect and observe macroinvertebrates to help in analyzing the quality of the water site they are visiting. Students should wear boots or close-toed shoes that can get wet and muddy and dress appropriately for the weather – hats and jackets if it is chilly. We will bring test water to the classroom if it is storming or extremely cold and windy.

During the fourth session we are back in the classroom as students are guided through the process of analyzing the data they collected. Now is the time we learn about pollutants that were found in the water and their possible source.

Last and final session: Now What? The students will examine all their test results and focus on the one area which is of greatest concern. They will work in teams to generate an Action Plan to improve the conditions of the water source where they conducted their water testing. They will also learn about BMP's (Best Management Practices), to impact the quality of water for all.

We encourage parents to ask their child about what they are learning in class during our sessions. Some suggestions might be:

- What is the name of the watershed in which you live?
- Where does water travel after it rains?
- Can you name a few pollutants that are entering streams, lakes and rivers?
- What is one way your family could conserve water?
- Tell me about what macroinvertebrates you found? What types? (pollution sensitive) (Ask after their creek experience....)

In closing, please look for communication from your child's teacher concerning specific dates and times we will be conducting our water testing. **We also would like to invite you to join us creekside. We can always use volunteers and it would be a great experience for you and your child.** Please notify your child's teacher if you are available. If you would like additional information, please feel free to visit our website at [kansariver.org/kawproject](http://kansariver.org/kawproject)

Thank-you for your time.

Sincerely,

Friends of the Kaw



What parents do to minimize stormwater pollution – when it rains pollutants are carried down the storm drains to area creeks and rivers negatively impacting water quality and wildlife habitat:

- Don't let your vehicles leak oil or gas on the pavement – maintain your vehicles regularly.
- Safely dispose of those unwanted household chemicals such as paint, motor oil, cleaners, and much more. This service is a FREE service for Johnson County residents only – <https://www.jocogov.org/dept/health-and-environment/environment/hazardous-materials/schedule-dropoff>
- Use lawn chemicals (fertilizers, herbicides, pesticides) properly. Read directions and only apply recommended amount. Don't apply right before a rain. Sweep or blow products off pavement.
- Safely dispose of expired, unused and unwanted medicines – <http://www.recyclespot.org/Recycle-More/Prescription-Drugs.aspx>
- Wash your vehicles at a car wash (they recycle their water.)
- Pick up pet waste and dispose of properly.
- Praise your students for NOT littering and recycling appropriate trash – follow their example!
- More information at: <http://kansasriver.org/stormwater/>

**BEST MANAGEMENT PRACTICES**  
(PERSONAL ACTIONS TO IMPROVE WATER QUALITY)  
CAN YOU DEVELOP A PLAN TO GET YOUR FAMILY, CLASSMATES, OR NEIGHBORS TO IMPLEMENT ONE OF THESE PRACTICES?

**Install Rain Barrels**

**Plant Native Vegetation**

**Dispose of Hazardous Waste Properly**

**Extend Downspouts to Grassy Areas**

**Plant Trees**

**Apply Lawn Chemicals Properly**

**Pick Up Pet Waste**

**Use a Commercial Car Wash**

**Stencil Storm Drains**

**Plant a Rain Garden**

## Kids About Water Creek Day Information

### **Students (and Parents):**

On the day(s) we go to the creek, river, stream, pond or lake, please be sure you dress for the weather.

- ❖ Wear closed-toed shoes that you won't mind getting wet, dirty or muddy (no sandals or flip flops)
- ❖ Wear comfortable clothing
- ❖ If the weather is windy or cold, be sure and wear a hat and warm coat or jacket.
- ❖ If it has rained a great deal leading up to your Creek Day, you may want to bring an extra pair of shoes to change into after your return to school. Rain boots are also an option to wear at the creek while water testing.
- ❖ Apply insect repellent and sun screen if necessary
- ❖ Allergies??? If you are bothered by being outside, be sure to plan ahead, or let your teacher know of any concerns.
- ❖ Parents are welcome to attend the Creek Day to observe.

We are looking forward to being with you on your water testing day(s)!





## Home Survey/Inventory

Name: \_\_\_\_\_

Grade: \_\_\_\_\_ Date: \_\_\_\_\_

School: \_\_\_\_\_

Teacher: \_\_\_\_\_

Please complete the following survey at home with an adult, and return it to your classroom teacher by \_\_\_\_\_. Thank-you!

- Look at the list of ingredients on the following items found in your household to see if they contain **PHOSPHATES**. If so, please place a check mark in the box marked YES. Phosphates can be listed under the names Orthophosphates, Pyrophosphates, Tripolyphosphates or Polyphosphates.

Item	Yes, Contains Phosphates	No, Does Not Contain Phosphates
Automatic Dishwashing Detergent		
Liquid Dishwashing Detergent		
Liquid Plant Food		
Cleaner for Countertops		
Oven Cleaner		
Window Cleaner		
Tile or Floor Cleaner		
Laundry Detergent		
Toilet Bowl Cleaner		
Soap used to wash cars		
Water Based Paints		
Fertilizers		

2. What types of batteries do you have in your house? (check all that apply)

Battery Type	
ION Lithium	
Re-Chargeable	
Alkaline	

How do you dispose of dead batteries?

\_\_\_\_\_ throw them in the trash                      \_\_\_\_\_ take them to the recycling center

3. What types of items do you recycle in your household? (check all that apply)

Item	Yes, we recycle these items
Aluminum cans or other aluminum items	
Paper	
Glass bottles	
Plastic	
Junk Mail or Old Mail	
Other: (please list)	



4. Do you have any methods of stopping or slowing down storm water runoff in your yard like a rain barrel or rain garden?

\_\_\_\_\_ no                      \_\_\_\_\_ yes, we have a rain barrel                      \_\_\_\_\_ yes, we have a rain garden



5. Now a few questions about PETS! (You may skip this question if you do not own a dog or cat.)



Do you own a cat that spends most of the time outdoors? \_\_\_\_\_ yes                      \_\_\_\_\_ no

How many dogs do you own? \_\_\_\_\_

When you take your dog(s) for a walk, how do you dispose of your pet's WASTE?

---

How do you dispose of your dog's WASTE in your own yard?

\_\_\_\_\_ I leave it alone and let nature take care of it                      \_\_\_\_\_ I scoop and deposit in the trash

Thanks so much for taking the time to complete this survey! Return it to your classroom teacher.

# Kansas Science Education Standards | 6<sup>th</sup> Grade

## K.A.W. (Kids About Water) Curriculum

Day One:  
Introduction to  
Watersheds and BMPs

Days Two and Three:  
Field Experiences

Day Four:  
Making Sense of the  
Data

<b>1: The student will develop the abilities to do scientific inquiry, be able to demonstrate how scientific inquiry is applied, and develop understandings about scientific inquiry.</b>			
<b>Standard 2: The student will apply different kinds of investigations to different kinds of questions.</b>			
student develops questions and adapts (frames) the inquiry process to guide the appropriate type of			
student differentiates between qualitative and quantitative data in an investigation.			
<b>Standard 3: The student will analyze how science advances through the interaction of new ideas, scientific investigations, skepticism, and examinations of evidence of varied explanations</b>			
student after completing an investigation, generates alternative methods of investigation and/or further inquiry.			
<b>The student will apply process skills to explore and understand structure and function in living reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms.</b>			
<b>Standard 4: The student will identify and relate interactions of populations of organisms within an ecosystem.</b>			
student understands how limiting factors determine the carrying capacity of an ecosystem.			
<b>Standard 5: The student will observe the diversity of living things and relate their adaptations to their survival.</b>			
student concludes that species of animals, plants, and microorganisms may look dissimilar on the outside but similar in internal structures, developmental characteristics, chemical processes, and genomes.			
student understands that adaptations of organisms (changes in structure, function, or behavior that occur over successive generations) contribute to biological diversity.			
student associates extinction of a species with environmental changes and insufficient adaptive			
<b>Standard 6: The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment, and natural hazards.</b>			
<b>Standard 2: The student will understand the impact of human activity on resources and environment.</b>			
student investigates the effects of human activities on the environment and analyzes decisions based on the benefits and risks.			

# Kansas Science Education Standards | 6<sup>th</sup> Grade

## K.A.W. (Kids About Water) Curriculum

	Day One: Introduction to Watersheds and BMPs	Days Two and Three: Field Experiences	Day Four: Making Sense of the Data
<b>3: The student will understand that natural hazards are dynamic examples of earth processes which cause us to evaluate risks.</b>			
student recognizes patterns of natural processes and/or human activities that may cause and/or contribute to			
student evaluates risks and defines appropriate actions associated with the natural hazard.			
<b>7: The student will examine and develop an understanding of science as a historical human endeavor.</b>			
<b>Benchmark 1: The student will develop scientific habits of mind.</b>			
student practices intellectual honesty, demonstrates skepticism appropriately, displays open-mindedness to bases decisions on evidence.			
<b>Benchmark 2: The student will research contributions to science throughout history.</b>			
student recognizes that new knowledge leads to new questions and new discoveries, replicates historic understand principles of science, and relates contributions of men and women to the fields of science.			



## Vocabulary

<b>aquifer</b>	large, natural, underground area in which water accumulates below the water table
<b>basin</b>	the area drained by rivers
<b>best management practices</b>	techniques which yield optimal results while creating minimal negative environmental side-effects
<b>biodiversity</b>	the variety of organisms considered at all levels; includes the variety of ecosystems, which comprise both the communities of organisms within particular habitats and the physical conditions under which they live
<b>conductivity</b>	ability of a material to transmit electrical charges
<b>control water</b>	clean water identical to test water but without the test contaminant, used as a basis of comparison to test groups
<b>drainage</b>	the removal of excess surface water or groundwater from land by means of surface or subsurface drains
<b>drainage basin</b>	area from which water flows into a river or complex of rivers
<b>ecosystem</b>	a contraction for "ecological system;" the interacting system of a biological community and its non-living environment
<b>erosion</b>	1) the wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep; 2) the detachment and movement of soil or rock fragments by water, wind, ice or gravity
<b>evaporate</b>	process through which a liquid changes to a gas
<b>floodplain</b>	area on each side of a waterway subject to being covered with water during periods of heavy rain
<b>ground water</b>	the water beneath the surface of the Earth, particularly that below the soil layer; consisting largely of surface water that has seeped down (the source of water in springs and wells)



<b>habitat</b>	the environment in which the life needs of an organism, population, or community are supplied
<b>hydrologic cycle (or water cycle)</b>	process through which water changes from liquid to vapor and back again while being distributed over the Earth
<b>impervious</b>	not allowing entrance or passage
<b>invertebrate</b>	animal without internal skeletons including sponges, worms, mussels, snails, crustaceans (lobsters and crayfish) and insects
<b>macroinvertebrates</b>	insects or other animals that lack a backbone, live on the stream bottom, and can be seen without magnification
<b>non-point source pollution</b>	contaminants that come from widespread practices rather than a single definable source; any pollution whose sources cannot be pinpointed
<b>overland flow</b>	process in the water cycle in which water travels across the surface of the Earth
<b>pH</b>	the measure of acidity
<b>point source pollution</b>	contaminants which stem from a clearly identifiable source; examples, smoke stack or a discharge pipe
<b>precipitation</b>	moisture that comes from the atmosphere (rain, snow, sleet, hail, mist, fog, and dew)
<b>producer</b>	organism which can make its own food (by harnessing the sun's energy through photosynthesis) ; examples: plants, algae)
<b>riffle</b>	section of a waterway characterized by shallow, turbulent flow with plenty of light and oxygen
<b>runoff</b>	that portion of precipitation on a drainage area that is discharged from the area <i>in stream channels-types include surface runoff, groundwater runoff, and seepage</i>
<b>sediment</b>	the solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice, and has come to rest on the earth's surface either above or below sea level

<b>storm drain</b>	<i>man-made inlet through which rainwater runoff passes from an urban land surface into a receiving waterway; purpose is to avoid property flooding</i>
<b>stormwater runoff</b>	precipitation that does not absorb into the ground but rather flows across the surface into a waterway
<b>stream bank</b>	the usual boundary, not the flood boundary, of a stream channel-right and left banks are named facing downstream
<b>tributary</b>	a secondary or branch of a stream, drain, or other channel that contributes flow to the primary or main channel
<b>water cycle</b>	hydrologic cycle; process through which water changes from liquid to vapor and back again while being distributed over the Earth
<b>water quality</b>	wide range of characteristics of water; including ability to support life, presence of dissolved substances, odor, taste, appearance, presence of silt and algae, etc. More narrowly: temperature, conductivity, pH and dissolved oxygen
<b>watershed</b>	land area in which surface runoff drains into a river or system of rivers and streams
<b>wetland</b>	any area that is more or less regularly wet or flooded and where the water table stands at or above the land surface for at least part of the year