



Discover the Kentucky River Watershed

Through History, Science, Art, Culture, Conservation,
Recreation and Education
Teacher and Community Tool Kit and Lesson Plans

Pat Banks and Roberta Hounshell

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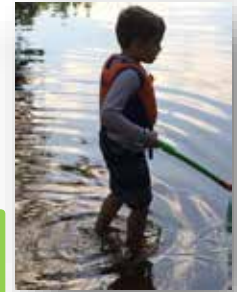
The Kentucky RIVERKEEPER
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Exploring the Kentucky River Watershed Through Science, History, Art, Culture, Conservation, Recreation, and Education

Pat Banks and Roberta Hounshell

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Thoughts on Stewardship, Values and Creativity

Overview from the Kentucky Riverkeeper
Pat Banks

For us to understand why it is of utmost importance to develop and practice stewardship of the Kentucky River Watershed, and of course, the world because we are part of the larger system, we must understand that what happens on the land and in the air affects what is in our water, and in our bodies. We have had different philosophies, languages, cultures, and experiences in our approach to using the land, water, and resources. We have had differences in our practices of stewardship, sustainability, and responsibility. In this collection of chapters, we are exploring the Kentucky River Watershed through the lens of science, history, arts, culture, conservation, recreation, and education. To support the lesson plans we have collected and created handouts, projects, and experiences to enhance, illustrate, illuminate, inform, and engage the students' senses and spark creativity and curiosity.

One of the first things to note is the idea of students (and teachers) keeping a "Journal." As the students work through the chapters, activities, maps, and handouts they will accumulate materials that need to be organized and presented. Students will learn some practical, basic skills such as using a ruler, glue and scissors while having an in-depth experience of what the Kentucky River Watershed means to all of us! (See suggestions on making the journal) This hopefully will be a meaningful resource and keepsake for the students. We have supplied some of the academic standards for your convenience, however we know there are more connections you (the teacher) can make through connecting disciplines, grade, achievement levels, and experiences. We have some teaching tips, ideas, and supports included in the materials as well!

We have an extended **RESOURCE** section. Some of the resources are for a specific chapter but some of them can be used throughout the chapters: How to make posters POP!, Creating a Journal, portfolio, poetry, maps etc.... so feel free to use these where they fit your schedule and class plans.

1. Geological History of the Kentucky River

Lesson Plan

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It took a long time for our world in general, and our Kentucky River watershed, in particular, to form. We want students to develop a sense of the flow of time, and an understanding of the river watershed from multiple perspectives. We want students to feel more connected to this river (watershed), become excited about their connection to this place, and how they (we) are connected to the larger world and universe. The students need to be part of the discussion about our on a healthy sustainable environment. We hope to expand the discussion of our stewardship responsibilities, our values, and practices in our watershed (and the world). This is the introduction to that project.

Activities and RESOURCES

- Student Text (print the Power Point Presentation or send to student Chromebooks/devices).
- Power Point Presentation: The Geological History of the Kentucky River Watershed (see link).
- **HANDOUT:** Map of the watershed. **RESOURCES.**
- **HANDOUT:** Geological History Scale Model. **RESOURCES.**
- **HANDOUT:** Geological History Counting Activity.
- **HANDOUT:** Poetry. **RESOURCES.**
- **HANDOUT:** Geological Timeline to mark the Eras and Extinction Events.
- **HANDOUT:** Recipe: Kentucky Geological History Chocolate Lava Cake.
- **The Geological Timeline**—Graph.
- **Make a poster or bulletin board POP! See RESOURCES.**
- **Create and organize materials in your JOURNAL. RESOURCES.**
- **Find /collect fossils from rock samples.**

2. The Mythical, Magical, Eluama, the Kentucky Riverkeeper Mascot

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This is the introduction of ELUAMA. She is the Kentucky Riverkeeper mascot. She is a magical water serpent that has taken residence in the Kentucky River and has many adventures with animals in the watershed. She learns about animals, plants, and (ancient and modern) people and uses her magical abilities to speak to them. Eluama can take on different forms and sizes. She can go on adventures, like riding on a drop of water through the water cycle. Her name ELUAMA comes from the Native American words ELU=beautiful and AMA=water (in some Native American languages) so her name means “Beautiful Water”. She chose her name because the first people she encountered in the Kentucky River were Native Americans.

Activities and RESOURCES

- Student Text (to be printed or sent to student Chromebooks/devices)
- **WRITING:** Students could add to the mythical, magical story of Eluama. They can include what her goals are as a mascot. Students could add an adventure with a new animal friend from the watershed.
- **WRITING HANDOUT:** Students write a poem of Eluama’s journey from River serpent to Riverkeeper Mascot. Use the **HANDOUTS** that describe Haiku, Alliteration, Sensory Poem, Acrostic Poems and give examples or select their own form of poetry.
- **WRITING:** Students can choose to become a character from the endangered/threatened species list (from the publications of Kentucky Department of Fish and Wildlife) and tell Eluama why they might be endangered or threatened. Students can discuss stewardship activities with Eluama to address the critical issues in their habitat. (Use this website: <https://fw.ky.gov/Wildlife>)

- **HANDOUT: DRAW Eluama:** Students imagine Eluama, and draw her in their journal. She is a mythical, magical water serpent/dragon usually without wings, but she is magical so she can develop wings/an ability to fly, etc. when engaged in a magical activity. She reveals herself differently to different people and in different situations.
- **HANDOUT:** Recipe: Eluama's Smoked Trout Cakes

3. Stewardship

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For us to understand why it is of utmost importance to develop and practice Stewardship of the Kentucky River Watershed (and of course, the world because we are part of the larger earth system) we must understand that what happens on the land and in the air affects what is in our water, and in our bodies. We have different philosophies, languages, cultures, and experiences in our approach to using the land and resources. Differences in stewardship, sustainability, and responsibility are part of our history. In this lesson, we will explore some of these differences.

Activities and RESOURCES

- **Student text (to be printed or send to student Chromebooks/devices)**
- **BRAINSTORM:** Students brainstorm, as a class, what their school could do to become more "earth friendly". Students can make a power point or video presentation of stewardship activities and present it to the class or in a school assembly.
- **Handout: "Stewardship Windssock"** featuring 10 (or more) stewardship activities that you could do. Display the windssocks around the school, and then take yours home. Share the stewardship activities with your family, and ask your family if they can commit to at least one! Use "making posters that POP" to help with designs and presentations!
- **RESOURCES.**
- **HANDOUT: Design a poster.** The handout addresses how to design an effective poster, using the principals of design, to inform, focus and create a center of interest. Choose one of the issues in this chapter. Use words or images to illustrate and articulate the issue share ing some of the solutions that could be applied, and or practiced.
- **HANDOUT :** Write a poem using the text and vocabulary words as resources.
- **INTERVIEW:** Students stage an interview with classmates (with individuals and /or members of cooperative learning groups). You are a TV reporter who was assigned t a documentary series about pollution. Talk about the different kinds of pollutions (given in the chapter) and discuss ways to address them. Do not forget to address the dilemma with plastic waste!! You can film the interviews and share at a school assembly.
- **HANDOUT: Sky Woman Poster** "How to design an Effective Poster. See sample in **RESOURCES**. The Skywoman story teaches that all creatures and plants have special gifts that nurture and sustain us. It teaches us respect and gratefulness for nature.
- **HANDOUT: SKYWOMAN,** this is a read aloud version with tips on how to read out loud successfully.
- **Test your water** and record what you find. You could test water from a fish tank, creek water, water from your tap, or water from other sources. You can get simple water testing strips from the local pet store. The strip will test ph, acidity, nitrate levels etc. Contact the **Kentucky Watershed Watch** or your Kentucky Riverkeeper to request a volunteer to demonstrate how the volunteers test your water. t
- **Write a story about an animal or fish** to create a fictional character from the watershed. Identify a problem they might have in their environment, (such as siltation of the creek) and how it might affect a fish character. How? What could be a solution? Empower students to act. What might the action be? **Writing-** Pretend to go to the riverbank and tell Eluama about the different kinds of pollution that you have studied and ask her what she might have experienced .

Also tell her about some various stewardship activities you plan to do. You might ask her to “suggest “some stewardship ideas. You could also talk to her about the Skywoman story. Write your conversation as an ELUAMA story.

- **HANDOUT:** Recipe, Eluama’s Magical Bountiful Zucchini Berry Muffins. **RESOURCES.**

4. Watershed/Habitat

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The Kentucky River Watershed and Habitats are ancient. We have had ice ages and ancient seas. The rocks, geodes, layers of slate, coal, and sandstone tell the ancient epochs and histories of the region. There are trees hundreds of years old that grow on hillsides, in valleys, and wetlands. They provide food, seeds, leaves, fruits, and shelter for many animals. Some of trees include walnut, persimmon, oak, maple, cedar, and pine. The grasslands were/are vast and have wildflowers, vegetables, and herbs. The network of springs, creeks, streams, and rivers are numerous. This watershed has multiple habitats that support deer, bison (buffalo), squirrels, raccoons, foxes, bears, woodpeckers, eastern bluebirds, cardinals, yellow finches, robins, bats, ring-necked snake, black snakes, copperhead snake, box turtle, snapping turtle, snails, grasshoppers, lightning bugs, mudhoppers and a vast number of butterflies and moths. The trout, paddle fish, catfish, gar, and bass once filled the waters in abundance. Bats and birds’ nest on the rocky palisades and rock cliffs. (See the endangered species listed below) People have lived in this watershed and habitat for thousands of years!

Activities and RESOURCES

- **Student Text (print or send to student Chromebook/devices)**
- **HANDOUT: Simulation activity for habitat.** This simulation activity illustrates how habitats, and the balance of nature in general are impacted by pollution. The activity shows how a disturbance can cause a chain reaction not only in one habitat, but can impact others, and can have an impact on the entire natural balance. See the handout for materials, set-up of the activity and rules. **RESOURCES.**
- **WATER TESTING:** Conduct testing on water from different sources around your school and from home. Inexpensive water testing kits can be found at Walmart, Target, pet stores, online. The Kentucky River Authority, the Kentucky Riverkeeper, and the Kentucky River Watershed Watch are resources for educating students about water testing and operation of the lock and dams. They may have a staff person or volunteer that could come to your class.
- **WRITING/RESEARCH:** Add to the mythical, magical, Eluama story in this chapter. The story in this chapter introduces some animals that can be found in the Kentucky River watershed. Refer to Chapter 2 and **research** and describe the **habitats** of the animals featured in the story. Use standard field guides and or “Kentucky Fish and Wildlife- Wildlife Diversity”, <https://fw.ky.gov/wildlife-diversity> –google: Wildlife diversity + Kentucky Department of Fish and Wildlife. The publications have information on animals/plants that endangered and threatened in Kentucky. Reasons are given and planned actions on what to do about it. Select three (3) species from the list of endangered species. Learn about the species and why they are endangered. In your mystical/fantasy story pretend to be at the river. Tell Eluama about these species. Include in your writing stewardship activities that could help bring the species back from the endangered status. Add your story to your journal!
- **(Embedded in text) WRITING/RESEARCH Descriptive Notes and Illustrations:** Research, illustrate and describe (at least 3 fauna) a fish, animals, insects, butterflies, bees, clams, snails, bats, reptiles and or birds. Identify some plants that can be found in their Kentucky River watershed habitat. Research the preservation status. Students can use standard field guides for the above creatures and plants in the region and the “Kentucky Fish and Wildlife- Wildlife Diversity” (<https://fw.ky.gov/wildlife-diversity>). Make a google query: Wildlife diversity + Kentucky Department of Fish and Wildlife). The KFW publication has information on animals that are endangered and threatened in Kentucky

including some of the reasons why they have that status. Some mitigation or corrective plans for actions are completed or in progress. See: Kentucky Monarch Conservation Plan posted on the Kentucky Department of Fish and Wildlife website: <https://fw/ky.gov>. Google search: Kentucky Monarch Conservation Plan. Add your plan to your journal/notes.

- **HANDOUT: Puzzle:** Students complete the puzzle of the Kentucky River Water Trail, created by Pat Banks, Kentucky watercolor artist and the Kentucky Riverkeeper. Add to your journal.
- **HANDOUT/PROJECT: "How to make a butterfly garden".** Students will see a list of plants that attract butterflies. Along with this **research** the Kentucky State Preservation Plan for the Monarch Butterfly (see website above). Add to your journal.
- **HANDOUT: Observing and Drawing Leaves** from the Kentucky River Habitat. Add to your journal.
- **READING/WRITING handout: Wendell Berry-**Students read and interpret the quote from **Wendell Berry**, a famous Kentucky writer, who has a farm right on the Kentucky River. How does this connect to the endangered species list? Write a short paragraph with an explanation/interpretation, in your own words.
- **HANDOUTS: Rules and examples for poems: Haiku, Sensory Poem, Acrostic Poem-** Use the vocabulary list and list of endangered species as a resource for writing a poem. Write it or copy it for your journal. See Handout with poem genres and sample in the RESOURCES section.
- **WRITING/DRAWING:** Backyard Habitat Map- describe, label, and illustrate your back yard! Do you have grass, rocks (what is under the rock?) trees, forest, field, creek, cave? Draw it! Do you have animals that visit, squirrels, birds, raccoons, opossums, snakes, or lizards? Add to your journal.
- **FIELD TRIP:** Ask your family to take a field trip to the Salato Wildlife Center, Frankfort KY- the center has several different habitats/exhibits with animals, fish, plants etc. Students can report their experiences to the class or write a paragraph in their journal. Ask your parents or Grandparents to take you for a walk in the woods or field. Can you identify any plants, trees, flowers, animals? Explore your world!
- **HANDOUT:** Recipe: Mint Tea or Mint Tea Slushie.
- **HANDOUT:** Recipe: Edible Flowers and Greens. *Always have a field guide and an experienced adult!*



5. The First People

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It is understood that Native American history goes back over eleven thousand (11 thousand) years in Kentucky. It must be noted, however, that much of that rich cultural history happened before recorded history and most of what we know, or think we know, about Native American history is recorded and stored within the Commonwealth of Kentucky's archaeological records. Documented are the remains of thousands of camps, villages, town sites, caves, rock shelters, leftover monuments, and earthen and stone mounds. Some still waiting to be found. The history of Native Americans has not been clearly documented because their culture and history were handed down in oral traditions. Some stories remain and their artifacts help tell their story. We have much to discover.

Activities and RESOURCES

- **Student Text (print or send to student Chromebooks/devices)**
- **HANDOUT: Freeman Owle, Storytelling/Reading a story out loud.** The story told by Freeman Owle is included. This handout also has tips on how to read out loud effectively to keep the audience engaged. Students can also use the stories of "The Three Sisters" and "Skywoman" to read out loud or tell the stories. (See separate **HANDOUTS** for the stories). Students can read or tell the stories to their class or all school assembly and mount the posters/drawing in

their journals or display in the school.

- **RESEARCH: Cherokee Alphabet**, Students research how the Cherokee alphabet was established. They report their findings in a paragraph and include it in their journals. **HANDOUT:** "Cherokee Alphabet". Write the characters in the alphabet and the sample words written in Cherokee.
- **HANDOUT: Cherokee Syllabary**– Make a copy of the letters to see how different and clever they are. See the graph page and use for easy copying.
- **HANDOUT: THE 7 CLANS OF THE CHEROKEE**, Draw the seven masks that represent the seven clans on the handout. The masks can have some variation, the native artisans used different materials to make the masks, so there was some creativity and interpretation involved, but they represented a specific clan. Add this handout to your Journal. As a class or in cooperative learning groups research the 7 clans of the Cherokee, explain what their purpose and names are. Pick the clan you feel would be best suited for you and your talents and design a mask for yourself and other members of your clan.
- **HANDOUT: DRAWING- Squash Beans and Corn.** Students draw squash, beans, corn to show how they were planted to support each other. Include plants and animals that could be in the field, a butterfly, a bird, a mouse, etc., any living thing from the habitat. Add to your Journal. See the three sisters' legend. **RESOURCES.**
- **WRITING:** Have students write a conversation with the mythical and magical Eluama. They can tell her about their imagined life as a Native American child, or anything else they learned in this chapter. Have the students write in form of a dialogue. Add to journal.
- **WRITING:** Poetry. Students use the HANDOUTS featuring the poems forms of Alliteration, Haiku, Sensory Poem, Acrostic Poem, or students choose their own form of poetry. Use any of the content and vocabulary as a resource.
- **HANDOUT/ STEREOTYPES:** As a class, brainstorm about what students think they know about the native people. What do they hear and see on TV, books, movies etc. What do they know about headdress, housing, smoke signals, language, etc.? As a class or in groups students compare the information from their brainstorm with the information provided in the **HANDOUT** regarding stereotypes. Have students determine which were factual and which ones were not. Have students discuss how stereotypes could come about. Do they have a purpose? Are they beneficial or harmful. Compare and Contrast opinions and facts.
- **HANDOUT:** Simple Construction Paper Weaving. **RESOURCES.**
- **HANDOUT:** Woven Wall Hanging Using natural materials. **RESOURCES.**
- **HANDOUT-**Legend of the Three Sisters. **RESOURCES.**
- **HANDOUT:** Recipe: Three Sisters Casserole with Cornbread Topping. **RESOURCES**

6. The First Settlers, The Path Through History and Children Living on the Frontier

Lesson Plan

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Reenactors from Boonesborough

The history of the first settlers in the Kentucky River Watershed is intertwined with the native people and world events. This is a joyful, tragic, and complicated story. We won't be able to do justice to this rich history, but we want to try to make some connections and links for the future scholars we hope to inspire. We have made note of some significant dates, treaties, and events. Some of these are regional in nature but the larger world outside of this region had significant impacts on the people, settlements, land use, and development of the Kentucky River Watershed as we now know it!

Activities and RESOURCES

- **Student text (print or send to student chrome books/devices)**
- **Pottery, Baskets, Weaving, Blacksmithing, Candle making and Soap making would be a few of the skills and crafts that the settlers brought with them to the settlements. The Kentucky Arts Council has a catalog of teaching artists and crafters that can come to the classroom to demonstrate and teach these arts to students. The KAC also offers grants to cover the cost of the visiting artist!**
- **HANDOUT-** As a class or cooperative learning group read the article: **“Kentucky, Where the Buffalo never Roamed”**, (See RESOURCES section for the article). Discuss what you learned. If you worked as a group, present your findings to the class. The group can also present a chart/ PowerPoint comparing buffalo and bison. Have students share their opinion as to why the expression “Buffalo” continues to linger when the correct name for the animal is Bison. It is important to remember that the Native Americans had their own names for the animal, but the name the Settlers used came from the French word “BOEF” for beef. When the Native Americans used the name “Buffalo” they only copied it when speaking with the Settlers. See **RESOURCES**.
- **HANDOUT: Make a crazy quilt** from paper scraps). See **RESOURCES**.
- **HANDOUT: Build a flat boat model.** See **RESOURCES**.
- Use the facts presented in this lesson (or the students’ own research from this time period) to write the history of the first settlers up to the time Kentucky became a state, from the standpoint of the Riverkeeper mascot, Eluama. Eluama can come to the riverbank to tell her story from the perspective of living in the river. She might talk about her observing settlers and Native peoples engaged in activities on the riverbank. She may have heard stories from animals that live in the watershed. Forest animals might have come to the river to tell her stories about Native people and/or the First Settlers. Make it fun and write in dialogue form.
- **Write/Tell** the story of a day living on the frontier as an adult. Choose your job and/or interests: Basket weaving, candle making, soap making, weaving, hunting, gardening, farming, blacksmithing (working with metals), woodworking (furniture and more) and or teacher of a one room schoolhouse. Do your own research for this assignment. You can write this in prose. Add it to your journal. Dress up in costume to present your story.
- **Make a Timeline** of the events presented in this lesson. Add it to your Journal.
- **HANDOUT: Historical Reading**, read the supplied passages from “Daniel Boone- in his own words”. Use the helpful hints supplied to make the reading interesting and engage your listeners. Dress up in character to add interest. **RESOURCES**.
- **HANDOUT: Compare and Contrast** the statements Daniel Boone made in the historical reading in this chapter with what is found in the article, “Kentucky, the Land where the Buffalo Never Roamed”. As a class or cooperative learning group, have the students read the article and discuss what they learned. Groups present their findings to the class. In addition, the groups could also present a chart/ power point comparing and contrasting buffalo and bison. Have students share their opinions about why the name “buffalo” continues to linger when the correct name for the animal is “Bison. Hint: The French word for “beef” is “boef” and the Native Americans had their own names for the animal (some are included on the handout). When they used the name “buffalo” they just repeated what the settlers said in their language. Have students research the various names tribes have for the bison? Students share their findings with the class. **RESOURCES**.
- **HANDOUT: Write a Poem(s)** Use this chapter and the vocabulary list as a resource. Alliteration, Haiku, Acrostic, Sensory. Rules and examples for these genres are given. **RESOURCES**. Add to your Journal.
- **HANDOUT: Recipe, Burgoo** traditional and modern. Have a taste from the frontier!
- **HANDOUT: Recipe, Daniel Boone’s Spoon Bread**. Daniel Boone’s favorite food was reportedly Spoon Bread. Try to fix this in the classroom to share but if that doesn’t work ask your family if they could help you fix this at home! (Note: Boone Tavern in Berea has this dish on their menu!)

7. Kentucky River Water Trail

Lesson Plan

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A water trail consists of marked routes on navigable waterways such as rivers, lakes, canals, and coastlines. Small boats like kayaks, canoes, single sailboats or rowboats, and sometimes motorized vessels are used recreationally on the water trail. A water trail is the water, it is to the water what a hiking trail is to land. The Kentucky River Water Trail is described by Kentucky Ecotourism as one of the most beautiful scenic routes, comparable to Arizona's Grand Canyon and Europe's Rhine River. In this chapter, the beauty and diversity of this river is highlighted. The trail is growing organically one county, lock portage, park, and community at a time. The river connects us to each other and is a spiritual and physical connection to the natural world. Please note that the mythical, magical Eluama has a bird's eye view of the Kentucky River and all of the diversity. The river provides water to over 1,000,000 (one million) people. Native people have used the Kentucky River for over 12,000 years!

Activities and RESOURCES

- **Student Text**
- **Study the Kentucky River basin map.** Locate the Towns on the river and put a star in them.
- **HANDOUT** the Governor's Acclamation. **RESOURCES.**
- **HANDOUT:** MAP, where do your students live? Where have they traveled? Find the place(s) on the map. **RESOURCES.**
- **Local Lore-** Ask a local fisherman to talk to your class about fishing and traveling on the river! (Grandparent?) Kentucky Fish and Wildlife can be a resource. Record their story and add to your journal.
- **Water safety Rules-**In your journal, copy and record the water safety rules for riding in a canoe kayak or boat on the river.
- **Have each student read about/study a different area or pool of the Kentucky River** ,The Kentucky River is rich in cultural and natural history. **It has been a Water Trail for over 12000 years!** Native Americans lived and hunted here for thousands of years. Much of early Kentucky history follows the Kentucky river and her tributaries. T
- **HANDOUT the Kentucky River Water Trail Map. (artist rendering)** The river is lined with palisades and is home to endangered species and plants. See the artist rendering of the Kentucky River Water Trail. Use the Kentucky River Watershed Map to create your own version. Add the lock and dams. Locate where you live? What animals (fish, bats, birds etc..) do you want to add to your map? Add to your Journal. If you want to go larger like for a bulletin board, project the map as large as you need . Trace it and have students draw paint or use markers to create their version of the illustrated Kentucky River water trail Map!
- **Stewardship-**As with any trail it is always good manners and good stewardship to take out (garbage)more than you bring in!
- **HANDOUT: Puzzle**, complete the puzzle showing some of the flora and fauna in the watershed by artist Pat Banks. **RESOURCES.**
- **WATER TESTING:** Conduct testing on water from different sources around your school and from home. Inexpensive water testing kits can be found at Walmart, Target, pet stores, online. The Kentucky River Authority, the Kentucky Riverkeeper, and the Kentucky River Watershed Watch are resources for educating students about water testing and operation of the lock and dams. They may have a staff person or volunteer that could come to your class.
- **HANDOUT MAP -DRAW:** Students draw or trace a map of the Kentucky River or (use the HANDOUT of the provided map as a guide. Find and mark YOUR location and that of major cities. Students can add in animals and plants from the Kentucky River watershed habitat (you may use the print of the water trail by Pat Banks, Kentucky watercolor artist as guide), but select your own favorite animals from the Kentucky River watershed). **RESOURCES.**

- **FAMILY FIELD TRIP:** Students ask their families to take a fieldtrip to Shakertown and take a riverboat ride from Shaker Landing. The students report their experience to the class.
- **FAMILY FIELD TRIP:** Ask your family to take a field trip to Fort Boonesborough which is located on the water trail. Students report experiences to the class. Students can include observations/descriptions for the chapter about the First Settlers in Kentucky.
- **HANDOUT:** Recipes: "Water Trail Mix" & Wild Edible Salad.

8. The Kentucky River Water Cycle

Lesson Plan

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Students usually learn about the water cycle in the early grades. So why is it included in this curriculum? As stated earlier, there is no new freshwater on earth. Water keeps moving through the steps of evaporation, condensation, precipitation, and collection in the water cycle. We want students to realize that pollution affecting the river does not have to occur directly near the river. It can be anywhere in the world. Any action connected to pollution in the watershed has an impact on the river. Our actions impact others and their resources, and the actions of others impact us and our local resources. Trash and pollutants washing into the soil, sewer system, creeks ponds, anywhere in the watershed, impacts the river. We want students to think in a local and global perspective. We are all shaped by water.

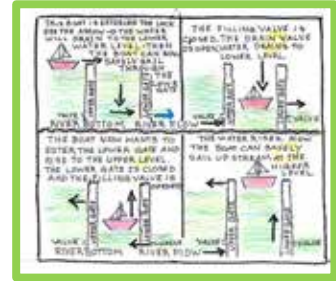
Activities and RESOURCES

- **HANDOUT:** Students draw their own simple sketch of the water cycle, label the stages in the water cycle, and color their drawing. Add to journal. See handout in **RESOURCES**.
- **OBSERVATION:** Place a mug in the bottom of a bowl. Add water around the mug so that it comes up about 2/3rd of the mug. Draw on the bowl, mark where the water level is. Cover the bowl tightly with cling wrap and fasten it around the bowl with a string or a rubber band. Note in your journal what happens.
- **WRITING:** Elaborate on the story of the mythical, magical, Eluama riding on a water droplet as it moves through the water cycle. Let your imagination run wild as you take this ride though the water cycle. Add to journal.
- **HANDOUT: POEMS-** Write a poem about the different stages you encounter in the water cycle. You might feel it is majestic to ride on the water droplet, you might feel sad as you get washed into the gutter with some trash, etc. See **HANDOUT** giving examples of the different forms of poetry. **RESOURCES**.
- **HANDOUT:** Build the terrarium as directed on the handout to simulate the water cycle.
- **ACTIVITY** described in the chapter: Simulate EVAPORATION.
- **ACTIVITY** described in the chapter: Build a Water cycle, terrarium. **RESOURCES**.
- **HANDOUT: Recipe:** Stuck in a Glacier Chocolate Mint Cookies. **RESOURCES**.
- **HANDOUT:** Make a poster showing the water cycle. Use the suggestions and samples from **Making posters POP!** in **RESOURCES**.

9. Kentucky Lock and Dam System

Lesson Plan

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According to William Greer, “**The Five Lives of the Kentucky River**”, “A river is a living creature. It has personality, feelings, moods, and its own life.” The first engineers, beavers and crawdads, help sculpt the river for thousands of years and supported the plants and animals that thrive here. The first people used the river as a place to settle, build their villages, raise their crops, and as a “water path” for travel and trade. The early settlers also used the river to travel up and down the river to reach the fertile Bluegrass area. The wild, untamed river was shallow much of the year and was unpredictable but navigable during the spring “tides” (floods). Canoes were the vessels of choice before the locks because they could be lifted and portaged around obstacles and shallows. And then there were locks.

Activities and RESOURCES

- **Student Text** (print or send to student Chromebooks/devices)
- **HANDOUT: Kentucky Water Trail Map.** You may have one from the Water Trail Chapter. Locate your town and the pool nearest you.. **RESOURCES.**
- **Explain Pascal’s Law** to your class (you will find it in the text. You can also research what other sources say).
- **Resume:** pretend you want to apply for the job of a lockmaster. Write a resume that fits the requirements (you might want to do research beyond what is presented in this chapter about the job of a lockmaster. Go to Eastern Kentucky University’s, Library, historical archives. It contains interviews with former lockmasters by author Bill Ellis) - Also see guidelines for writing a resume in the **RESOURCES.**
- **Five lives of the Kentucky River:** Explain what author William Greer means by, the five lives of the river. Give a short explanation of each “life”. What is the sixth life?
- **HANDOUT:** Draw a model of a lock and dam and then explain how a lock and dam system works. (Pascal’s Law). A poster or a power point presentation might be an appropriate or effective way to present this law. Add to journal. See **RESOURCES.**
- **VIDEO:** Find the video from Kentucky Fish and Wildlife with David Hamilton, Engineer, on staff with the Kentucky River Authority. (Google search: Utube + Kentucky River Locks and Dams, KYAfield, May 4, 2015)
- **HANDOUT:** Students build a flatboat. Use the handout that describes the features of a flatboat. Describe pros and cons of a flatboat and what this vessel is best suited for on a shallow flat river. **RESOURCES.**
- **HANDOUT: RESUME:** Students learn to write a resume: A job agency asked you to provide a resume for the job of lockmaster. Be clear in describing the responsibilities and qualifications needed. Students may google some resume formats: <https://www.rocket-resume.com/> or at <https://www.resume-now.com> or at <https://www.resumegenius.com> Pretend to go down to the river to tell Eluama about how locks and dams work and what their purpose was /is. Be sure to include questions Eluama asks about this topic.
- You have just purchased a historic paddle wheeler and want to use it to open a tourism business on the Kentucky River. Design a poster, or write a story, to get your customers and tourists interested in the new venture! Describe what they will see on their paddle wheeler journey, what they can eat, and what the boat looks like inside, etc. Make it so inviting and interesting that people will want to include a trip on your boat (**by all means**) in their vacation plans!! You might use as a source: <https://charlesdickespage.com/steamboat-trip.html>. “From Pittsburgh to Cincinnati in a Western Steamboat”. Charles Dicken American Notes-Volume II, Chapter the Third-1842
- **Use the enclosed recipe for Blackberry Cobbler.** Get a taste of the past! Bake one for the class. Blackberries were and are still plentiful in the Kentucky River watershed. **RESOURCE**

Resources, Recipes, Handouts, Activities and References

RECIPES To taste and smell the watershed.

- Daniel Boone's Spoonbread (The First Settlers)
- Eluama's Magical Bountiful Zucchini Berry Muffins (Stewardship)
- The Lockmaster's Wife's Blackberry Cobbler (Locks and Dams)
- Kentucky Water Trail Mix (Water Trail)
- Mint Tea or Mint Tea Slushie (Habitat)
- Stuck in a Glacier Chocolate Mint Cookies (Water Cycle)
- Kentucky Geological History Chocolate Lava Cake (Geological Timeline)
- Burgoo (The First Settlers)
- Three Sisters Casserole with Cornbread Topping (Native Americans)
- Eluama's Smoked Trout Cakes (Eluama)
- Recipe: Edible Flowers and Greens. *Always have a field guide and an experienced adult! (Habitat)*

HANDOUTS/ACTIVITIES:

HANDOUT: Ideas for Creating a Journal. RESOURCES.

- **HANDOUT: Draw a model of a lock and dam** and then explain how a lock and dam system works. (Pascal's Law). A poster or a power point presentation might be an appropriate or effective way to present this law. Add to journal.
- **POWER POINT- Rabbit and Bloodroot-** This lesson plan incorporates an animal and plant in the Kentucky River Watershed. The process of drawing, learning watercolor techniques and a final painting is illustrated step by step. **RESOURCES.**
- **HANDOUT: Build a flatboat model.** Use the handout that describes the features of a flatboat. **RESOURCES**
- **HANDOUT: Draw the water cycle** on the handout with the river in the center then color and label. There are several choices. Include in the journal.
- **HANDOUT: MAP DRAWING:** Students draw a map of the Kentucky water trail (use HANDOUT of the provided map as a guide), or if needed use the printout to mark YOUR location and that of major cities. Students add in animals and plants from the Kentucky River watershed Habitat (you may use the print of the water trail by Pat Banks, Kentucky watercolor artist as guide), but select your own favorite animal from the Kentucky River watershed. Add to journal.
- **HANDOUT: Puzzle:** Complete the puzzle showing some of the flora and fauna in the Kentucky River Watershed. **RESOURCES.**
- **Cooperative learning strategies for teachers. RESOURCES.**
- **HANDOUT: Make a crazy quilt** as directed by the handout. **RESOURCES.**
- **HANDOUT: Simple Construction Paper Weaving. RESOURCES**
- **HANDOUT: Woven Wall Hanging with natural fibers. RESOURCES.**
- **DRAWING: Students draw squash, beans, corn** to show how they were planted to support each other. Include plants and animals that could be in the field, a butterfly, a bird, a mouse, etc., any living thing from the habitat.
- **HANDOUT: "Cherokee Alphabet".** Write the characters in the alphabet and the sample words written in Cherokee. **RESOURCES.**
- **HANDOUT: THE 7 CLANS OF THE CHEROKEE:** As a class or in cooperative learning groups research the 7 clans of the Cherokee, explain what their purpose and names are. Pick the clan that is the best match for you and your talents. Design a mask for yourself and other members of your clan. **RESOURCES.**
- **HANDOUT- Draw - Masks of the Seven Clans. RESOURCESS**
- **HANDOUT: Puzzle of the Kentucky River Watershed Map.** Made from the art of Pat Banks, Kentucky Watercolor artist. See handout in **RESOURCES.**

- **HANDOUT: Design a poster illustrating an image from the Sky women story. Refer to “How to design Poster that POP!** Remember how this story illustrates special gifts that all creatures and plants have and that we need to nurture and appreciate them. Also think of some of the important characters like the turtle that you could illustrate.
- **HANDOUT: illustrated Elements of Art. RESOURCES**
- **HANDOUT: Illustrated Principles of Design.** Make your posters and bulletin boards POP! **RESOURCES**
- **HANDOUT: “Stewardship Windsock”** featuring 10 (or more) stewardship activities that you could and would do. Display the windsocks around the school and then take yours home. Share the stewardship activities with your family and ask your family if they can commit to at least one! **RESOURCES.**
- **DRAWING: Design an illustration of Eluama!** She is water serpent/dragon usually without wings, but she could develop wings/an ability to fly, etc. when engaged in a magical activity. She reveals herself differently to different people in different situations. Add to journal.
- **HANDOUT: Governor Andy Beshear’s Acclamation of the Kentucky River Water Trail Project.**
- Overview of the Project.
- Cooperative Learning Strategies .**RESOURCES.**
- **HANDOUTS: How to make the portfolio and the journal for this project. RESOURCES.**
 - Writing is encouraged in each lesson/chapter. Each chapter is an opportunity for writing poetry using vocabulary that is river/habitat related. Rules for each form and examples are included for the following: Haiku, Acrostic poem, Sensory poem, Alliteration. (NOTE: other forms of poetry are also welcome). See this section for **HANDOUTS** with rules and examples for each genre listed above.)
 - These writings, poems, stories, and interviews, etc....should be included in the student journal.
 - The tools of the **elements and principles of design** are an integral part of the discovery process, whether it is scientific and artistic observation, historical illustration or creating presentations and POSTERS that POP! Art is a fundamental, foundational tool to interpret our world.
 - Each chapter has an opportunity to add to the Eluama stories shared in several chapters. The stories are to be written in form of a conversation between the author and Eluama, using the information/topic of the lessons. Inclusion of information gained from independent research on flora and fauna of the habitat is also encouraged.

References and Resources:

Braiding Sweet Grass, Robin Wall Kimmerer, 2013, Milkweed Editions, Canada.

A Handbook of Native American Herbs, Alma Hutchens, 1092, Shambhala Publications. Boston mass.

Kentucky Threatened and Endangered Species, Ky Department of Fish and Wildlife, Tim Slone and Traci Wethington, 1998, Kentucky.

Strong Voices: Native American Women of Kentucky, Judy Sizemore, Arts Meets Activism Grant from the Kentucky Foundation for Women. 20004, Louisville Kentucky.

Kentucky Boating and Fishing, Kentucky Fish and Wildlife, 2009.

Kentucky River Navigation Charts, Kentucky River Authority, 2002, Frankfort KY

The Kentucky Arts Council is a great classroom resource. The KAC has a roster of performing artists for character performances, music and visual artists that can help students with their journals, and or other native American dance, crafts, pottery, basket making, and weaving.

The Kentucky Native American Commission sponsors a program, “Annual Living Archaeology Weekend” at Red River Gorge, Gladie Cultural and Environmental Center.

Wild Souls, Emma Marris, 2021, Bloomsbury publishing, NY, NY

The Cherokees past and Present J. Ed Sharpe, Cherokee Publications, 1970

Cherokee Plants, Paul B. Hamel & Mary U. Chiltoskey, 1975

Environmental Ethics, Albert J. Fritsh, Anchor Books, 1980

Water Consciousness, Tara Lohan, Altnet Books, 2008

Kentucky Fish, Division of Fisheries Benjy T. Kinman, , 1993

The Kentucky River, William Ellis,2000, University Press of Kentucky, Lexington KY

The Five Lives of the Kentucky River, William Grier, 20001, Jessie Stuart Foundation, Ashland Kentucky

Braiding Sweet Grass, Robin Wall Kimmerer,2013 Milkweed Editions, Minneapolis, Minnesota

“Do Indians Live in Tipis? “Questions and Answers from the National Museum of the American Indian, Smithsonian Books, Second Edition, Library of Congress

"A is for Appalachia", Linda Pack, Illustrated by Pat Banks, University Press of Kentucky

"Toys and Games of Appalachia" Linda Pack, Illustrated by Pat Banks, University Press of Kentucky

"Plants of Appalachia" (forthcoming 2023) Linda Pack, Illustrated by Pat Banks, University Press of Kentucky

<https://blog.kachinahouse.com>

<https://explorekyhistory.ky.gov>

[https://www.visitlex.com-Indegenous Americans in Kentucky](https://www.visitlex.com-Indegenous-Americans-in-Kentucky)

[https://heritage.ky.gov-A Native History of Kentucky](https://heritage.ky.gov-A-Native-History-of-Kentucky)

<https://www.familysearch.org>

<https://www.afn.ca>

[https://www.ourstate.com/cherokee-stories -tell -of waters-wisdom](https://www.ourstate.com/cherokee-stories-tell-of-waters-wisdom)

https://ducksters.com/history/native_americans/life_as_a_native_americian_child.php-Susan Mullins, Mohawk, Iroquois Nation

<https://www.britannica.com>

<https://www.nps.gov>

<https://smokymountainnews.com>

www.thesunmagazine.org. July 2000, "Where the Buffalo Go" by Derrick Jensen

Human Resources and Readers:

Susan Mullins, KWARONHIAW, Rep of the Kentucky Native American Commission, Artist, Interview, Reader

Judy Sizemore, Writer, Kentucky Arts Council, Resource, Reader

Susan Tipton, Lee Co art Teacher, Reader

Samuel Lockridge, Kentucky Arts Council, reader.

Teri Williams, Editor, Reader, Kentucky Riverkeeper Board Member, editor.

Malissa McAllister, University of Kentucky, Water Resources Research Institute, Kentucky River Basin Team Coordinator, Kent

David Hamilton, Director of the Kentucky River Authority, reader.

Dr. Alan Banks, Emeritus, Eastern Kentucky University, Former Director of the Center for Appalachian Studies, Founder and President of the Kentucky Riverkeeper, reader.

Dr. Tom Bonny, Estill County School Superintendent, reader.

Caston Masters, Teacher, reader.

Linda Pack, teacher, author, reader

Sponsored in part by and special thanks to: The Kentucky RIVERKEEPER, Kentucky River Authority, The Kentucky Arts Council and the Water Resources Research Institute, University of Kentucky

Students are encouraged to send a copy of a prized original work to: Kentuckyriverkeeper@gmail.com, Selected pieces will periodically be published on the Riverkeeper website and/or included in the Newsletter. All submissions will be recognized with a certificate that recognizes the student for their contribution to the knowledge and stewardship of the Kentucky River watershed.



**Discover
the
Kentucky
River
Watershed
Journal**
Make it your
own! Check out
ideas in the
resources.

1. The Geological History of the Kentucky River Watershed

Pat Banks and Roberta Houndshell



Grades: 3-8 **Time:** 2 class periods and additional periods depending on what activities are chosen.

Unit Objective: Discover the Kentucky River Watershed Through History, Science, Art, Culture, Conservation, Recreation, and Education while Cultivating Stewardship Practices.

Introduction

It took a long time for our world in general and our Kentucky River watershed in particular to form. We want students to develop a sense of the flow of time and an understanding of the river watershed from multiple perspectives. We want students to feel more connected to this river (watershed), to become excited about their connection to this place and how they (we) are connected to the larger world and universe. The students need to be part of the discussion about our dependence on a healthy sustainable environment. We hope to expand the discussion of our stewardship responsibilities, our values, and practices in our watershed (and the world). This is the introduction to that project.



William Shatner, Captain Kirk, was invited to take a short trip into space in 2021, this is what he thought when he looked out one window and saw the blackness of space on one side and the blue sky and white clouds of earth out the other window. "I saw life here, death over there."

"The Earth is a little grain of sand in the desert of the universe, and we are these tiny things on the grain of sand. But we are aware of our insignificance. How beautiful is that?"



Lesson Objectives:

- Students will be able to describe the enormosity of the geological timeline.
- Students will be able to demonstrate their understanding about the mass extinction events in the geological timeline and that they happened before humans existed. There were five major mass extinction events described in the presentation.
- Students will be able to demonstrate that they understand the connection between humans and pollution. Students will understand why some plants and animals have become endangered or extinct in the last few hundred years and be able to describe how pollution and loss of habitat is impacting the Kentucky River watershed and our earth.
- Students will be able to explain that humans can, also, influence and revert these destructive trends by developing responsible practices and stewardship.



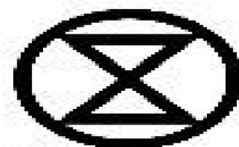
Materials:

Download the PowerPoint presentation:
“Geological Timeline of the
Kentucky River Watershed”
from the RESOURCES section.

- Student journals see RESOURCES.
- Glue stick
- Scissors
- Coloring pencils or crayons
- Additional activities in the RESOURCES section may have other materials suggested.

Vocabulary:

1. Watershed: An area or ridge of land that separates waters flowing to different rivers, basins, or seas.
2. Tributary: tributary: A river or stream flowing into a larger river or lake
. Geology: geology: A science that deals with the history of the earth and its life, especially as recorded in rocks. The science that deals with earth’s physical structure and substance, its history, and the processes that act on it.
. Pre Cambrian: Precambrian: Noting or pertaining to the earliest era of earth history, ending 570 million years ago, during which the earth’s crust formed and life first appeared in seas.
5. Paleozoic: Paleozoic: The era of geological history that extends from the beginning of the Cambrian to the close of the Permian and is marked by the culmination of nearly all classes of invertebrates except the insects and in the later epochs by the appearance of terrestrial plants, amphibians, and reptiles.
. Mesozoic: The era between the Paleozoic and Cenozoic eras, comprising the Triassic, Jurassic, and Cretaceous periods.
7. Cenozoic: The most recent era of geological time, from about 5 million years ago to the present. This era is characterized by the formation of the modern continents and the diversification of mammals and plants.
. Extinction: The process or act of becoming extinct coming to an end or dying out.
9. Endangered: Facing an extremely high risk of becoming extinct
10. Earth Day: A Day that was set aside (April 22) to demonstrate support for environmental protection. It was first held April 22, 1970. It is now a wide range of events coordinated globally by Earthday.org including 1 billion people in more than 19 countries. (Wikipedia)
11. Stewardship: The job of supervising or taking care of something, such as an organization or property.
12. Extinction Symbol: The symbol consists of a circle representing Earth with a stylized hourglass inside. It represents the threat of the Holocene (the last 11,700 years of the Earth’s history) which means extinction on Earth. The hourglass is a warning that time is running out for many species on Earth. The symbol dates to 2011 and has been attributed to anonymous East London artist Goldfrog ES





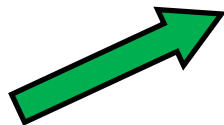
Procedure:

Pre-assessment: Teachers conduct a brainstorm activity with the class so that students connect to prior knowledge and personal experiences: Record answers on a chart or in electronic form. **Be sure that you have the information available at the conclusion of the lesson to compare pre-lesson and post-lesson knowledge.**

Ask students: While Brainstorming:

- What do you know about rivers, creeks, lakes, etc. in Kentucky? Have you ever been swimming in a river, lake? Have you floated, paddled a canoe or kayak, and/or fished?
- Have rivers, lakes and streams always been on earth?
- Do you know what pollution is?
- Have you heard of Earth Day? What is that about?
- Have you heard of endangered or extinct species? What do the words mean?
- What happened to dinosaurs? Why are they no longer alive? How long ago did they live?
- Have you ever found a fossil? What is it?
- Teachers, include the vocabulary knowledge of words that are enclosed in this chapter but have not been mentioned yet.

NOTE: Teachers keep the notes from the brainstorm activity so they can be referred to as part of the post lesson assessment.



Show the Geological PowerPoint presentation: Instruct students, prior to watching the PowerPoint, to count the number of mass extinction events as indicated by the extinction sign. The hourglass in a circle (extinction sign) indicates that the earth as we know it could be running out of time if we do not change our habits and become responsible stewards of our earth and its re-sources.

At the teacher's discretion, students can read the text on the slides in turns, the teacher can read the text to the students, or the teacher can paraphrase the text as appropriate to the group of students. The presentation should take about 30 minutes if completed in one session. It is fine to show the presentation in parts and discuss what students remember after having viewed short sections.

Ask students to get into cooperative learning groups (If teachers are not familiar with such strategies, there are some included in the **RESOURCES** section for your convenience.)

- Have students discuss what they remember from the presentation.
- Review the PowerPoint presentation with the class, focus on the extinction events and why they occurred.
- Go into as much detail as appropriate for the age of the student.

Ask students to count how many extinction events were shown in the PowerPoint presentation.

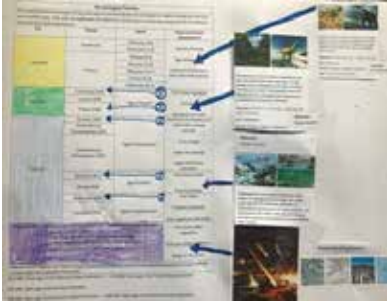
- Answer: Five, each event is indicated in the presentation with the hourglass extinction symbol.
 - **1st.** 440 million years ago: early Paleozoic - glaciation.
 - **2nd.** 360 million years ago: mid Paleozoic - glaciation caused by changes in the earth's carbon cycle through increased photosynthesis.
 - **3rd.** 251 million years ago: end Paleozoic - giant lava flows and continental collision.
 - **4th.** 199 million years ago: mid Mesozoic - lava flows from breakup of the continental collisions.
 - **5th.** 65.5 million years ago: end Mesozoic: lava flows and a meteor hit earth where Mexico is now. All this happened without human influence. It is nature. But what about today? Are changes happening faster? Do we have choices?

Continued next page.



Procedures continued...

- The class completes the Geological timeline (enclosed) as a group, with guidance from the teacher. Students can color the different eras (in the colors indicated) and add the extinction symbol, and pictures (as indicated). The geological timeline template and pictures can be printed from the **RESOURCES** section.



This is how you might add the photos to your timeline in your journal. Draw the arrow from the photo to the appropriate epoch.

- Ask students if they know of some simple stewardship activities that could help the earth, in general, and specifically our Kentucky River Watershed. Home? School? Community?
- Have a short discussion involving topics and answers from the pre-lesson assessment brainstorm activity.

Post-lesson assessment:

- Teacher evaluates the completed geological timeline as described in #5 above. Students glue the chart into their journals.
- Journal entry: Each student lists at least two stewardship activities (they might know them as Earth Day activities). Make a sketch of a fossil some one may have found or brought into class.



- Teacher evaluates class discussion (and or group discussions) to check understanding of lesson objectives – at teacher discretion determine what content is most suitable for your age group.
- Teacher addresses content shared during the brainstorm activity, including potential misconceptions.
- Teacher evaluates evidence of additional activities completed as determined at the discretion of the teacher.

The river
moves from
land to water,
to land, in and
out of
organisms
reminding us
what native
peoples have
never
forgotten: that
you cannot
separate the
land from the
water,
other people
from the land.

Lynn Culbreth
Noel





Short essays by Mary Hufford, Phd.

Thoughts (squibs) on the Geology of the Watershed

Eastern Kentucky's part of Appalachia is called the Cumberland Plateau. "Plateau" seems a strange name for the rugged mountains of Eastern Kentucky, but 350 million years ago, long before the mixed mesophytic forest evolved, the entire region lay at the bottom of a shallow inland sea. The fossil record from this period includes traces of marine animals embedded in sedimentary deposits of sandstone, shale, and lime. Three hundred million years ago, a continental collision between North America and Africa, in an event known as the Appalachian orogeny, raised the floor of the sea into a plateau above the water's surface. Since then, water cutting a downward course through that uplifted rock has carved the plateau into thousands of streams, creeks, forks, and branches – all tributaries of the Kentucky River. It was in the rich colluvium accumulated in deeply riven coves and hollows that the world's world's oldest and biologically richest temperate zone hardwood forest evolved. Spreading over the past 30 million years across the rumpled terrain of the Allegheny and Cumberland Plateaus, from northern Mississippi and Alabama across Tennessee and Kentucky to southeastern Ohio and southwestern Pennsylvania, a forest system took hold that botanist E. Lucy Braun called "mixed mesophytic" (medium moisture-loving).

What makes the mixed mesophytic forest so unique? Whereas most forest types are dominated by two or three canopy species, the mixed mesophytic system features nearly 80 woody species in its canopy and understory, including beech, tulip tree, basswood, American chestnut, sweet buckeye, birch, black cherry, white ash, butternut, black walnut, sourwood, red mulberry, paw-paw, persimmon, four kinds of magnolia, and multiple species of oaks, maples, and hickories. According to E. Lucy Braun, this diversity persists because the glacial sheets that covered land masses to the north never made it to the Appalachian plateaus. During the period of the ice age, from two and half million to 11,500 years ago, life forms continued to evolve and diversify in the coves and hollows of Eastern Kentucky, which thus provided a refuge for plants and animals that elsewhere disappeared during centuries of freezing temperatures. Places in which life is protected from disastrous events like the ice age are known as "refugia." The coves and hollows kept temperatures stable enough to support life throughout the ice ages. E. Lucy Braun theorized that the seed stock preserved in the coves eventually replenished the forests of Eastern North America. A nickname that some ecologists apply to this system is the "Mother Forest." Could the same coves and hollows protect life from destruction in the face of rising temperatures?

Communities living in the region today continue to prize the gifts of forest diversity, not only as economic and subsistence resources, but as templates for patterning life. Formulas like "plant corn when the oak leaves are as big as a squirrel's ear," and "look for morels when maple leaves are the size of a squirrel's ear" illustrate in a small way the role the forest plays in shaping the worldviews of its inhabitants. The environment itself bookmarks memories, issuing cues for hunting, gathering, cultivating, and celebrating to which generations of the region's citizens have responded.

Activities:

- **Complete** the activity in which the **geological timeline** is represented by a 1:16 scale model (see handout in **RESOURCES**). In this activity, students count how long it takes to count to certain extremely large numbers. They also discuss conditions that could influence how long it takes different people to complete this activity. (See handout in the **RESOURCES** section)
- **Complete the Counting Activity** to experience how long 4.5. billion years is (see Handout: Counting activity for Geological Timeline in the **RESOURCES** section).
- For young grades the book: **“How much is a million”, by David Schwartz**, could be useful to get the concept of one million introduced before moving on. The book uses various examples of how big a number like one million really is. You can find this book in the library.
- **Create a poster** that imagines the beginning of the Kentucky River watershed! See how to make POSTERS POP! In **RESOURCES**.
- **Make this fun recipe:** “Kentucky Geological History Chocolate Lava Cake” (see recipe handout in the **RESOURCES** section).
- **Look for fossils** in creek rocks, limestone gravel, cliff faces, and other places rocks are found. You will not be able to place the fossils in the historical timeline because they will (probably) be misplaced and or moved from the strata from which they were formed. But they are fascinating. Drawings of found fossils could be sketched into the student journal.
- **Write a fun poem** using some of the vocabulary words.

Example Haiku:

Geological
Our physical time to shine
Be good stewards now

Pat Banks

SOURCES:

[https://greenplanet for kids.com](https://greenplanetforkids.com)
www.nationalgeographic.com
www.Kids.nationalgeographic.com

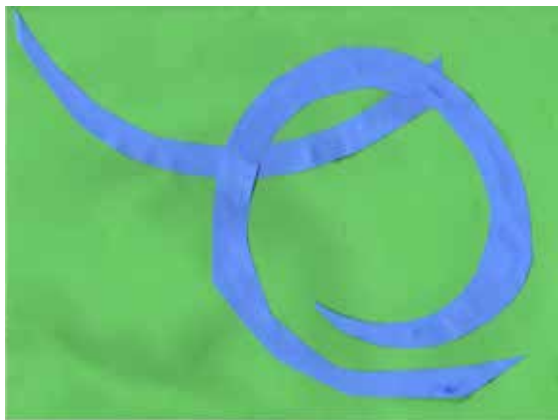
The Five Lives of the Kentucky River, William Grier, Jesse sturart foundation, Ashland KZ

Illustrated Vocabulary of Elements of Art:
RESOURCES

Look for these and other handouts in **RESOURCES!**

We hope the **RESOURCES** will help you use all of your senses! Explore your Kentucky River Watershed!

- Student Text (print the Power Point Presentation or send to student Chromebooks/devices)
- Power Point Presentation: The Geological History of the Kentucky River Watershed (see link)
- **HANDOUT:** Map of the watershed
- **HANDOUT:** Geological History Scale Model
- **HANDOUT:** Geological History Counting Activity
- **HANDOUT:** Poetry
- **HANDOUT:** Geological Timeline to mark the Eras and Extinction Events
- **HANDOUT:** Recipe: Kentucky Geological History Chocolate Lava Cake
- **The Geological Timeline**—Graph
- **Make a poster or bulletin board POP! See RESOURCES.**
- **Create and organize materials in your JOURNAL.**
- **Find /collect fossils from rock samples.**
- **And more!**



Imagine how long it took for the Kentucky River to form and all of the trees, fish, birds, frogs and even US !!!!!

2. ELUAMA - The Kentucky River Mascot

Pat Banks and Roberta Hounshell



Stewardship is defined as the job of supervising or taking care of something, such as an organization or property. **Conservation** is the prevention of wasteful use of a resource. But stewardship and conservation are much more, it is also the language we use to describe our environment, it is our relationship to our environment, and it is the actions we take to live with and in our environment not against it! Emma Marris stated that "Conservation needs to be about protecting other species with people. It's about improving our relationships with the nonhuman world." Robin Wall Kimmerer likes to imagine "that when Skywoman scattered her handful of seeds across Turtle Island, she was sowing sustenance for the body and also the mind, emotion, and spirit: she was leaving us teachers. The plants can tell us her story: we need to learn to listen."

Time: 1-2 periods to read the story and draw a picture of Eluama as she reveals herself to the students that learn about her adventures and friends.

Grades: 3-8

Unit Objective:

Discover the Kentucky River Watershed through history, science, art, culture, conservation, recreation, and education while cultivating stewardship.

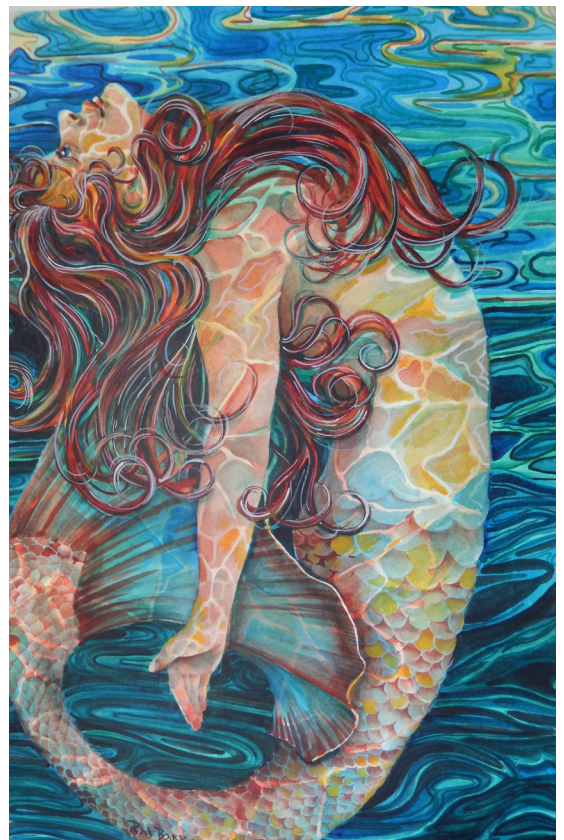
Lesson Objective:

Students will be able to retell the story of how Eluama became the Kentucky Riverkeeper Mascot.

Students will be able to explain how Eluama can help them build connections between themselves and the Kentucky River Watershed.

Students can explore the river through Eluama's eyes.

Students will be able to draw Eluama as she has revealed herself to them.



Eluama is a shape shifter, a magical being, a figment of our imaginations. She can become what she needs to be, to protect the river and all of its creatures

Materials:

Student text (printed or in electronic form)

Student journal– Pencils, markers, paint, drawing paper, glue.

Materials to draw, paint or sketch Eluama

Lesson Procedure:

Hand out the student text or send to electronic devices.

Discuss the concept of stewardship.

Students read the story out loud in turns or the teacher reads the story to them.

Discuss student knowledge of the purpose of a mascot (in this case Eluama).

Discuss comprehension questions (teacher determines what questions and how many questions students answer in their journals).

Journals: the journals will help student collect and organize their art, notes, and projects. The arts play an important role in our understanding of our world. In **Critical Evidence**, Sandra Rupert, stated, “Arts Learning experiences contribute to the development of certain thinking, social, and motivational skills that are considered basic for success in school, work, and life.”

Have students draw a picture of Eluama in their journals. She can manifest in many forms. What do they see. They can draw a cartoon version of an Eluama adventure or Eluama meeting a new friend in the watershed.

The use of cooperative learning strategies is highly encouraged in addressing this content. Some strategies are included in the Resources section of this curriculum!



Ideas for a student journal: use natural and found objects to add interest, play with textures, and encourage design elements not usually associated with a book.

INTRODUCTION to Eluanna:

The mission of **Discover the Kentucky River Through Science, History, Art, Culture, Conservation, Recreation and Education**, is to look at the river through multiple lenses and perspectives. Help students and people reconnect to the river and the natural world through their senses, hearts and minds. We believe that we need to reconsider how we relate to the non-human world and understand what stewardship can really mean, to our earth in general, the Kentucky River watershed, and to us.



Eluama is a light hearted approach to looking at the environment, creatures , plants, and critters in the Kentucky River watershed. This is where we introduce ELUAMA . She is new Kentucky Riverkeeper mascot. She is a magical water serpent that has taken residence in our imaginations and in the lore of the Kentucky River. She has many adventures with animals in the watershed. She learns about animals, plants, and people (ancient and modern). She uses her magical abilities to speak to them and to listen. Eluama can take on different forms and sizes. She can go on adventures, like riding on a drop of water through the water cycle. Her name, ELUAMA , comes from the Native words ELU=beautiful and AMA=water (in some Native languages) so her name means “Beautiful Water”. She chose her name because the first people she encountered in the Kentucky River were Native people. Native communities were the original stewards of natural resources. They realized the ever-important relationship between people and the natural world, especially to water. The Native people’s philosophy is that humans and nature need to live together in harmony. They were the first people to live in the Kentucky Watershed. They lived in this area for over 1,2000 years. Their ways were respectful to the gifts the water and land gave and they took their responsibilities to the water and land very seriously. They taught Eluama and helped her grow. They practiced a stewardship that preserved or sustained the land and water for seven generations to come! They wanted their children and grand-children to be able to thrive in what they left behind.

Teachers, please share with your students:

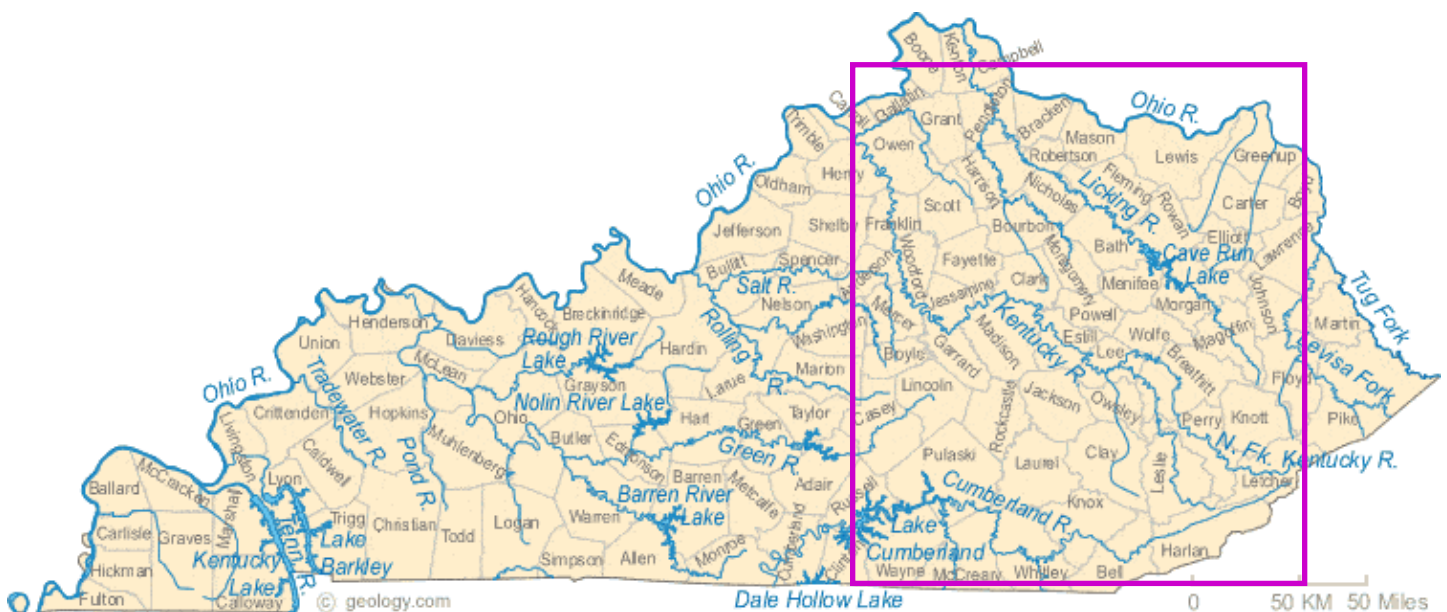
Students are encouraged to keep a JOURNAL. They will include stories, poems, drawings, notes, and maps that are connected to information they have learned, and will learn, in this curriculum. They can make fun and tasty recipes, build, and create 3d projects and other hands-on activities. Topics include the study of animals and plants in the river habitat, the science of water cycles, the importance of stewardship, and appreciation of the beauty of the watershed, study the histories, cultures, and stories of the river. Students can also write about new information they learn through independent research related to the Kentucky River, on any of the topics. We hope to have the students use all their senses through the course of this project.

The Kentucky Riverkeeper is an independent non-profit organization devoted to the preservation of the Kentucky River and the communities that depend upon it. The group focuses on education, research/monitoring, litigation, advocacy, and listening to the voices of citizens and leaders throughout the watershed. Their website can be accessed for more information. The Kentucky Riverkeeper is part of the Waterkeeper Alliance, a group of more than 300 "keepers" around the world. The Kentucky Riverkeeper realizes that the future of our earth, with increasing importance, is in the hands of our young people. We take care of the people and things that are meaningful to us. As we learn about the importance of our water, land, and natural resources, they become of interest to us and hopefully more meaningful and cherished. When our hearts and minds become involved, we are motivated to value these gifts of clean air, clean water, and clean land and hopefully become the good stewards our watershed, and this world desperately need. Through the collection, provision of information, and experiences, this curriculum intends to teach students about the Kentucky River, its beauty, its importance to the land, and the creatures of the watershed and its importance and connection to them (the students). The curriculum provides interactive means and activities that are intended to create an interest in taking care of our world in general, and of our Kentucky River watershed in particular. Students are encouraged to submit copies of their creations, stories, or poetry related to this project to the Kentucky Riverkeeper, by email or regular mail. Some submissions could be chosen to be published on the Riverkeeper website and/or in their newsletter. Best of all, **students who send in work will be recognized as good stewards of the Earth/Kentucky River and will receive a Kentucky Riverkeeper Stewardship certificate!!** Their stories and poetry about Eluama will also help to establish her as the Riverkeeper mascot and as a representative for a clean environment!

Send copies of work to:

Kentucky Riverkeeper

email to: kentuckyriverkeeper@gmail.com



See the high lighted area. I shows how the Kentucky River flows through the landscape.

STUDENT TEXT

ELUAMA and the Kentucky River Watershed

Background:

Stewardship is defined as the job of supervising or taking care of something, such as an organization or property. **Conservation** is the prevention of wasteful use of a resource. But stewardship and conservation are much more, it is also the language we use to describe our environment, the actions we take to live with onot against it! Emma Marris stated that "Conservation needs to be about protecting other species with people. It's about improving our relationships with the nonhuman world." Robin Wall Kimmerer likes to imagine "that when Skywoman scattered her handful of seeds across Turtle Island, she was sowing sustenance for the body and also the mind, emotion, and spirit, she was leaving us teachers. The plants can tell us her story: we need to learn to listen.

We want to foster stewardship for our world, in general, and our Kentucky River, in particular. Based on public information, the Kentucky River provides more than 95 % of the drinking-water supply to almost 1,000,000 (one million) people along its 260 miles and its seven thousand (7000) square mile watershed. This means that about one sixth of the population of the Commonwealth of Kentucky gets its drinking water from the Kentucky River. In addition, a rich history is connected to communities in the watershed and the river provides a variety of recreational opportunities for local people and visitors alike. The watershed boasts rich diverse habitats and great natural beauty. Kentucky Ecotourism boosters have compared the Kentucky River's scenic beauty to Arizona's Grand Canyon and Europe's Rhine River.

The importance of clean water has formally been addressed with the passage of the 1972 Clean Water Act, passed by Congress under President Nixon.

Dr. Alan Banks summarized the act for this project: Under the Clean Water Act, all streams and waterways in the USA were required to be swimmable, fishable, and drinkable by 1985. These words are not precise, but they establish a long-held principle. Air and Water are deemed to be in the public trust; they are not private property that can be used or abused as the "owner's" wishes. Anyone who uses these natural resources has a responsibility to the public and to the nation. Air and water belong to all of us. The EPA, a federal agency, is charged with the task of protecting this public trust and providing access to clean air and clean water.

To assure that this would happen, a federal program called the NATIONAL POLLU-TANT DISCHARGE ELIMINATION SYSTEM was created. (Have your teacher give you information if you want to research that. The link can be found in the SOURCES section at the end of the teacher materials.)



Skywoman falling to earth with seeds and plants in her hands.

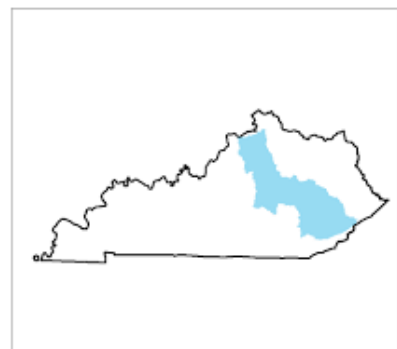
River facts:

The Kentucky River flows north, just like the Nile River in Egypt.

The Kentucky River is two hundred and sixty (260) miles long. From Beattyville north to Carrollton. But that doesn't count The North Fork, Middle fork and the South fork.

The Kentucky River supplies the drinking water to one million (1,000,000) people!

The Kentucky River has been used as a **water trail** for over twelve thousand (12000 years!



About Eluama; We are introducing this magical character as a fun and interactive way students might engage with stewardship ideas, language, observations and the arts (drawing, painting, sculpting, poetry and storytelling.) Here are some basic facts about this magical creature (but they of course can change as she evolves!)

Eluama (Elu=beautiful + Ama=water (in some Native American languages) is a magical, caring, and friendly water serpent. At least this is one of her forms) She is the adopted mascot of the Kentucky Riverkeeper. The Kentucky Riverkeeper is an independent, non-profit organization devoted to the preservation of the Kentucky River and the people , plants and animals, that depend upon it.

Eluama chose her name because the first people she encountered while swimming the Kentucky River (as a water serpent) were Native communities. Native people were also the original stewards of natural resources. They realized the ever-important relationship that humans have to the natural world, and especially to the water. The Native philosophy is that people and nature need to live together in harmony. The Native people, who were the first people to live in the Kentucky Watershed, chose actions that were intended to protect the river, and the benefits of its resources, for their descendants to at least into the 7th generation.

Eluama can be small and ride on small things, like on a raindrop. Imagine Eluama’s travels on a water drop through the water cycle. The earth’s water is continually being recycled around the globe and has been here since the beginning. This means that Eluama can ride on a water drop that was around during the time of the dinosaurs, during the time of ancient Egypt, or during any of earths historical periods. She could even have been trapped in a glacier for thousands of years. She could have been in a drop that watered beautiful flowers. In her travels, she might have, personally, experienced pollution in the water.

Eluama can talk and understand all languages. She has been in the dwellings of Native Americans and the First Settlers and listened to stories being told around the fire. She is part of nature and has vast knowledge but wants to learn and listen to even more. She enjoys listening to stories being told to her by visitors, animal or human, on the banks of the river. She is entertained by stories of all kinds and is ready to enter conversations. She wants to learn about the lives of adults and children. She wants to hear stories from Native Americans and the First Settlers and to discover their commonalities as well as their differences. Eluama can be small or large as she frolics in the river. Oh, what beauty she will see as she travels past the Palisades and the wetlands full of birds and other wild animals! On her travels she can see trees that are hundreds of years old, and she can stop on her travels to talk to them and listen to their stories. Remember she understands the language of trees and flowers also! Oh, the opportunities are endless!!!

The Kentucky Riverkeeper was so excited to meet this magical creature when the Kentucky Riverkeeper group was paddling kayaks on the Kentucky River at dusk. Only because Eluama was so enthralled learning new stories from the lightning bugs, she did not notice anyone coming and did not dive into the river as she usually does to conceal herself. Here is an interview that describes what took place, that evening, and how Eluama became the Kentucky Riverkeeper mascot and nature guide.

Hello Eluama! My name is Dex the explorer. I am learning so much about the Kentucky River! I can’t wait to paddle the river. I love to take photos of the animals and birds that I might see! Thank you for telling me that you saw an eagle’s nest! That will be the first thing I investigate while I kayak down the river.



Hi! My name is Chip, I am a squirrel, I have a little broken “chip” off of my front tooth, that is where I get my name. I love the walnuts, hickory nuts and hazelnuts that grow in the forest. Sometime, when I don’t eat all of the nuts I save for winter they will grow into a huge tree! Eluama, thank you for caring about my story! I will bring you some nuts next time I see you!



Hi, my name is Skip, the red fox. When I am really happy I kind of romp, jump and skip so my cub mates call be ‘Skip’. I live in a cozy den close to the palisades. There are so many things to watch and hunt. I saw you Euama last spring while you were floating on your back watching the clouds. Once, I was chasing a butterfly and leapt right into the river! I love to hunt and track small rodents. They are so fast and tricky!



Hi! Let me introduce myself I am Ricki, a raccoon. I am so clever. I can open just about anything that might have food in it and gates and fences can’t keep me out. I am so adaptable I can make a comfortable home just about anywhere in the watershed; a hollow log, a small cave, or someone’s attic! I am cute and have a beautiful striped tail and a black face mask.



Eluama, my friends call me Speedy, I am fast for a turtle, but what amazes people is how long I can live. I am a box turtle and can live over 30 years! Some of my cousins can live to be over 150 years, and some even longer! I love to catch and eat bugs but I really love spring greens and farmer John’s tomatoes. Please don’t tell anyone! I want to go back to the garden next year. Do you like tomatoes too?



These characters were designed by Dexter Banks . Maybe you would like to design your own characters?

Thoughts on Language by Marry Hufford, PhD

1. Native American cosmologies offer important teachings about how to care for our natural world, along with appreciation for how our natural world in turn cares for us. These teachings are often accomplished through storytelling. The story of Sky Woman exemplifies what some scholars call a “creation myth,” accounting for how we came to be as we are, in the world as it is. Such stories are used in many cultures to place human beings within an ancient and still unfolding story of the world and our places within it. A Cherokee creation myth tells of a flood that covered Central Appalachia. Raven was sent out to find evidence of dry land as the waters ebbed. Growing tired, Raven flew lower and lower, and where his wings touched the ground, valleys emerged between ridges. The resulting landscape became the home of the Cherokee people. Very few of the Cherokee names for places on the Cumberland plateau are likely to be found on official maps, inscribed with names that now tell the story of settlers who made their way from Europe, Africa, and other continents. Nor are many of the names used locally to refer to particular hollows, ridges, coves, points, flats, straight stretches, gaps, notches and other landscape features that are likely to have been named by Native American inhabitants. Place names used by descendants of settlers tie the landscape to stories of settlement, uses of forest species and waterways, industrial histories, and particular events.

Consider how place names connect us to cosmology, history, the natural world, and each other. It is safe to assume that every body of water and every crevice in the landscape is likely to have a local name, even if that name does not appear on an official map. Look up the animals and landscape features named on maps of Kentucky River headwaters. What do you know about those names and places? Have you heard people talk about them? Find someone in your community who can tell you how headwater streams got their names. Some headwater streams are “intermittent.” They show up on topographic maps as dotted lines. Supporting the shredders and decomposers that transform dying vegetation into soil, intermittent streams play a crucial role in the health of headwaters. The irregularity of the flow of water makes it impossible for fish to live there. This protects the invertebrates and amphibians that would quickly be eaten up by fish. Yet intermittent streams are no longer protected under state and federal law. How might protecting intermittent streams ensure the health of waterways throughout the Kentucky River? Many kinds of insects, salamanders, turtles, and frogs thrive in the intermittent headwaters. How many can you identify?

The Seasonal Round

Events that mark our calendar year remind us that we participate in multiple social and political bodies: familial, national, ethnic, global, professional, shared interest groups, and more. Our calendar year includes celebrations of our passages through human life cycles, marking dates of birth, and anniversaries of weddings and of the deaths of loved ones. In the U.S., we celebrate national citizenship by commemorating historical moments and contributors to the birth, defense, and inclusivity of nationhood: Thanksgiving, Independence Day, Memorial Day, Juneteenth, Labor Day, Martin Luther King Day, Veterans Day, Columbus Day/Indigenous Peoples’ Day and more. Many of us also celebrate ties to countries abroad through commemorations of political independence around the world. These times may be entangled with stories placing us within cosmic or sacred time through celebrations of solstice and equinox, Ramadan, Chinese New Year, Christmas, Kwanzaa, Hanukkah, Easter, Yom Kippur, Rosh Hashanah, Passover and more. Observations of historical events imply a timeline that is more linear, visualizing our common passage through stages of life or of history. Yet many of these feasts may remember and intertwine with yet another cycle: a continual returning of seasons and experiences known to our ancestors and now to us, and hopefully to those who come after us. Anchored in climates, ecosystems, and geographies particular to places the world over, the Seasonal Round offers many opportunities to celebrate nature’s gifts to community life.

Year round, the headwaters of the Cumberland Plateau are staging grounds for celebrations of wild flora and fauna, some unique to this region. These events prompt annual visits to woodlands, wetlands, and creeks: to dig for ramps in the spring; to pick edible wild greens; to catch emerging fish bait like stoneflies, mayflies, caddisflies, and hellgrammites; to collect morel mushrooms (also known as molly moochers, merkels, dryland fish, and hickory chickens) following the first warm rains of May; to follow the annual sequence of ripening berries from creek bottoms to ridges; to look for “sheds,” last year’s antlers discarded by bucks already growing this year’s new set; to see where ginseng and other roots are coming up; to read the “mast” – where are the nuts especially abundant and on which tree species? Why might this be of special interest to people in your community? What are the names of places where people go in practicing a seasonal round of activities?

Activity: create a wheel showing events that your family celebrates around the year. To how many communities do *you* belong (family, neighborhood, county, nation, globe)? How do you celebrate belonging to multiple communities through yearly events? How does nature participate in these celebrations? Make a list of ways in which local nature supports your community. How does the natural world connect you to your ancestors and even to community members who aren’t born yet? To human communities elsewhere? To more-than-human beings living around you? How many kinds of greens, fish, fish bait, medicinal roots, and wild nuts and berries do you know about? Where do people in your community go to find these? How do people in your community use them? How do they need to be prepared? How is the work of gathering and preparing wild foods distributed?

Eluama, From Water Serpent to Riverkeeper Mascot

Roberta Hounshell

Riverkeeper: “Good morning Eluama. Thank you for agreeing to this interview. Many will be surprised and skeptical of your existence as nobody has seen or heard of you. Also, water serpents like you are not supposed to be real.”

Eluama: “You are right. Until I accidentally was spotted by paddlers during a recent river sweep, I had rarely surfaced, especially during the day. When I did many, many years ago, there was a lot of fear and a lot of searching for me. So, I stayed safely hidden at the bottom of the river. You might have heard of a distant cousin who lives in Loch Ness, Scotland and everything that is going on there trying to locate him.

Riverkeeper: “Let’s tell the readers how we met.”

Eluama: “Yes, I didn't mean to be seen. However, to my surprise, when I surfaced and was seen, the humans did not start to scream and attack me. They talked in quiet voices and showed interest in me. As always, through my magic, I was able to understand their words and they were able to understand mine. I also understand the language of trees, flowers, and other plants.”

Riverkeeper: “When we first saw you, we had a good talk about what you were doing there, and we quickly discovered that we were all interested in the same thing: keeping our beautiful river as clean as possible for all creatures.”

Riverkeeper: “Tell us your story of how you got here and how long you have lived here.”

Eluama: “It is a long story or stories, but I will tell you this one if you really want to hear it.”

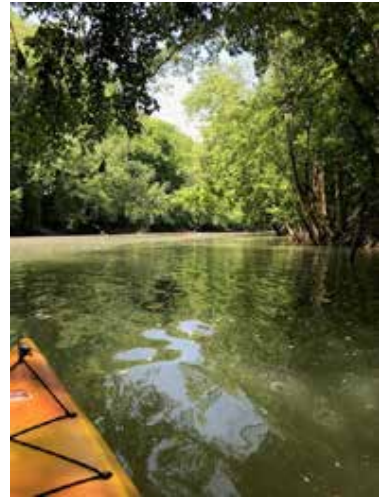
Riverkeeper: “Yes, I am sure there are many people who would really like to hear it.”

Eluama: **Here is one of the stories I tell. But there are others.** “I was born about 75,000 years ago, far away in the ocean. My family has existed for ages and ages but much of our history was lost in the mists of time. While I am a giant in your world, I am the runt in the family. I am 33 feet long and weigh 15,000 pounds. Our family of eight led a very quiet life far away in the ocean, and I spent my days playing with other sea creatures and hunting for food. We also listened to the stories of the water creatures. Then, one day, when we woke up, we discovered that all the other animals in the world were gone. We were the only creatures left. We were confused and didn't know what had happened.”

Riverkeeper: “I am sure that was scary!”

Eluama: “Yes, very much so. We swam long, long distances in the ocean until we finally met a few others like us. Nobody knew what had happened. We did not understand why we survived when other creatures did not. Stories were going around about a giant fireball hitting the earth. Some said they saw fire spewing out from inside the earth and that the ground shook and rumbled. I do remember that the sea was rough that night, but that happened often. There was a strange and wonderful result from all that occurred. Since that night, we seem to have magical powers and our food is a magical feast of sparkles and light.”

Riverkeeper: “Modern scientists have found out what likely happened. We can talk about that later if you want to. For now, just continue with your story.”



Eluama continued: Eluama: “Slowly, over a span of many years, other animals showed up in the oceans again. Somehow, we did not age but our bodies became slimmer and longer, until we became what we look like now. One day some “things” appeared swimming on top of the water, carrying creatures with two legs. Now, I know that those things were ships carrying humans. They were terrified of us because of their fear of the unknown. Well, my family told me that they and their cousins around the world had decided to swim around those ships, terrorize the sailors, and capsize the ships to drown them.”

Riverkeeper: “So you led that kind of a life along with your family?”

Eluama: “No, I did not and could not live that kind of life. Therefore, I did my own exploring and decided I needed to get away from that kind of life to find my own purpose. I swam for a long time in all directions, until one day I came to a place where the ocean stopped. Water flowed into the ocean through smaller armlike shapes. Later I learned that the water arms are called rivers.”

Riverkeeper: “What happened next?”

Eluama: “I swam closer and closer and watched for many days. Finally, I got the nerve to swim into one of the small arms. I liked it that the water was so much calmer than the ocean. Immediately, I was greeted by some nice fish and some furry creatures who told me that they were called river otters. Everybody was friendly. The otters and I swam together for a long time. I could not go everywhere they went because in some places the water was too shallow and I did not want to change my shape and scare them. I enjoyed their company and heard many, many stories of their lives and what was important to them.”

Riverkeeper: “So, how did you get here and how did taking care of the water become your mission?”

Eluama: “We swam up and down the river for days. One day, I ended up here and made new otter friends, one in particular. We had wonderful adventures together. In the evenings, other creatures came to the river and told their stories. So, I stayed for a while. Then one day, a boat carrying some humans came on the river. They saw me and were not afraid. I could understand their language and they understood mine. I learned they were called Cherokee. We soon became friends. We often talked about the water, how important it is to all life, and how we all must help take care of it! The Cherokee people even had a story about a sea mon-ster, Uktena, imagine that!! Uktena was horned, mean, dangerous, and deadly. I do not look anything like Uktena, thank goodness! The Uktena stories are scary but entertaining! At that point, I decided that I wanted to spend my life helping take care of the water and sharing ways to honor the water in the same way my new human friends did. Their children played with me in the water, and we had a great time. I learned that in some of the native languages “Elu” means beautiful and “ama ” means water, so I pulled the words together and took it as my name: Eluama. My otter friend took Equoni as his name, as it means “river”.”

Misty, foggy view of an early morning on the Kentucky River.



View of the Kentucky River.



**Can you see the river otter?
What else?**

Eluama continued:

Riverkeeper: "That is beautiful! What happened next?"

Eluama: "Well, for many years we all lived happily like that. Then, one day my Cherokee friends were gone. Other people came carrying things that looked like long sticks that made a very loud noise. One time they pointed the stick at me, and after a loud noise I felt a sharp pain. After that I rarely came up from underneath the water anymore. I stayed hidden from the human creatures at the bottom of the river.

As I said earlier, I was seen a few times. This always led to the humans searching for me and it became very hard to hide. So, I just stayed down there under the water, and kept in touch with my friend Equoni and other friends until the day you saw me."

Riverkeeper: "That was a lucky day for us. We are so glad that you remember all the stories the Cherokee told you about their respect for water. We are thankful that you want to help with our mission to keep the water clean and spread the message.

We love it that you agreed to be our mascot!!! You are our symbol of clean water and stewardship. We will tell your stories and share your adventures to inspire others to care about their/our water. We will inspire awareness that many creatures depend on the river, including many people who get their drinking water from the Kentucky River. We promise to protect you, and your secrets, as you help us spread an important message. There will be a lot of pictures of you, though, and maybe people will even wear your likeness on necklaces and jewelry! The Riverkeeper has created a sculpture of you to remind the people that you are here and watching over the Kentucky River, your new home.

Many people might not see you, but your stories, parables, and adventures will be told, including those told to you by creatures, plants, and trees around you!! Thank you, Eluama"

Eluama: "You are welcome. I am looking forward to it and I feel like a movie star: Eluama, the Riverkeeper Mascot! I will be watching you and helping where and when I can. Remember though, it is up to all of you to be a steward of your waters and teach your children the lessons of love and commitment to the river."

Riverkeeper: "Eluama, thank you for your mission and service to the Kentucky River Watershed. We will talk again soon, we hope!"

Eluama: "I am hoping to meet with you again, very soon!"



Watercolor images of a water serpent like Eluama. Use watercolors to create these magical shapes and colors. Experiment with your paint to create almost any color you can imagine just by mixing a few colors together. See **RESOURCES**.

After you have read the hand out and story, answer the following questions in your journal:

What is stewardship?

Who is Eluama and what does her name mean?

How did she get to the Kentucky River?

Draw a cartoon of one of your character's meeting Eluama! What is her mission? How will you connect with her? What adventures might you have with Eluama in the future?

What does she look like? (Hint: Since she is magical, she will reveal herself looking different every time.) Draw with colored pencils or use watercolors. See **RESOURCES** on drawing and painting techniques. Remember, she is a magical water serpent usually with out wings, but she could develop wings/ability to fly when engaged in a magical activity. She can be tiny and ride on a water drop or large enough for us to ride her. She might look like a dragon or some other ser-pent. Add these to your journal and or make a bulletin board with Eluama and the characters the class have creat-ed

Recipe!!! Make Eluama's Smoked Trout Cakes!
See in **RESOURCES**.

END STUDENT TEXT

3. Stewardship and the Kentucky River

Pat Banks and Roberta Hounshell

Lesson Plan



'We must begin thinking like a river if we are to leave a legacy of beauty and life for future generations.'

David Brower

"Conservation needs to be about protecting other species with people. It is about improving our relationships to the non human world."

Emma Marris

Thoughts on Stewardship and our Values, an Introduction

For us to understand why it is of utmost importance to develop and practice Stewardship of the Kentucky River Watershed (and of course the world because we are part of the larger system) we must understand that what happens on the land and in the air affects what is in our water and in our bodies. We have had different philosophies, languages, cultures, and experiences in our approach to using the land and resources. Differences in stewardship, sustainability, and responsibility are part of our history. In this lesson, we will explore some of these differences. Gary Nabhan has written, "We can't meaningfully proceed with healing, with restoration, without re-story-ation." In other words, we need to hear and tell stories about who we are, where we came from, and why our actions matter. What follows are some of the stories, histories, and consequences of different practices of stewardship in the Kentucky River Watershed.

Our histories connect us to the legacy pollution issues we face today!

There were many things that we did not know, understand, or foresee about our mining, timbering, farming, and urban development practices.

But we do know now. The health of the watershed is connected to our health, the health of our communities, and the world.

"When all the trees have been cut down, when all the animals have been hunted, when all the waters are polluted, when all the air is unsafe to breathe, only then will you discover you cannot eat money."

Native American Quote



Grade: 3-8

Time: Two periods for the core lesson plus additional time depending on what activity(ies) the teacher selects for completion.

Unit objective:

Discover the Kentucky River Watershed through History, Science, Art, Culture, Conservation, Recreation, and Education.

Lesson Objective:

Students will keep a journal to organize notes, handouts, and drawings.

Students will be able to list facts about the various kinds of pollution.

Students will be able to define stewardship.

Students will be able to describe how their health is connected to clean water, air, and soil.

Students will be able to state the reason for the Clean Water Act and sum up its content.

Students will be able to give examples of how Dr. Kimmerer and William Ellis identify some choices of language and how it may influence our values and actions regarding how we live with our environment.

Materials:

- Student text
- Record the brainstorm activity with charts, electronic devices, or other.
- Highlighters
- Student journal
- Handouts from the **RESOURCE** section to support selected activities
- Materials, as needed, for activities, see **RESOURCES**.



Mountain Top removal site.



Stoney Run Creek in Madison County.



Lesson Procedure:

Pre-lesson assessment

1. Brainstorm student knowledge of basic terms such as value, consequence and responsibility, stewardship, and their understanding of the relationship of these terms to our environment.
2. Brainstorm student knowledge of the different kinds of pollution.
3. Brainstorm student knowledge of stewardship activities.

NOTE: Teacher will record student answers in a format that can be utilized when discussing the same content post-lesson. Students can be given student text in printed or electronic form - students can read the text out loud in turns, or the teacher can read all (or sections as determined) out loud as students highlight sections as directed.

Post comprehension questions: (compare answers to answers given during the brainstorm)

- What are the types of pollution?
- What is stewardship (taking care of something responsibly) and what are ways we can practice stewardship?
- What do Dr. Kimmerer and William Ellis say about the use of language?
- What is the Clean Water Act and why was it passed?

NOTE: The use of Cooperative Learning Strategies is highly encouraged! See the section that lists some Strategies in the RESOURCES section! Select an appropriate strategy for your class and activity. Be sure to model and practice the strategies if students are not familiar with using them.

Assign one of the activities suggested below to the entire class or assign different activities to cooperative learning groups. Have groups share findings with the entire class upon completion.

Post-lesson assessment/journal entry:

Select a comprehension question (or several), as discussed in the procedure section, and ask students to document the answer(s) in their journals. The teacher could also select one.

Note the answers on the board and have the entire class answer the same question using the notes from the board.

Have students record evidence of the activity they completed in their journal.

Have students copy the definitions of value, responsibility and consequence, and stewardship into their journals from the vocabulary presented in this chapter. **(NOTE: Teacher can use discretion as to the extent and nature of the post lesson assessment in regard to meeting lesson objectives)**





Thoughts on Stewardship and our Values

For us to understand why it is of utmost importance to develop and practice **Stewardship of the Kentucky River Watershed** (and of course the world, because we are part of the larger system) we must understand that what happens on the land and in the air affects what is in our water, and in our bodies. We have had different philosophies, languages, cultures, and experiences in our approach to using the land and resources. Differences in stewardship, sustainability, and responsibility are part of our history. In this lesson, we will explore some of these differences.

Stewardship is defined as the job of supervising or taking care of something, such as an organization or property. **Conservation** is the prevention of wasteful use of a resource. But stewardship and conservation are much more, they are the language we use to describe our environment, our relationship to our environment and it is the actions we take to live with and in our environment not against it! Emma Maris stated that “Conservation needs to be about protecting other species with people. It’s about improving our relationships with the nonhuman world.” Robin Wall Kimmerer likes to imagine “that when Skywoman scattered her handful of seeds across Turtle Island, she was sowing sustenance for the body and also the mind, emotion, and spirit: she was leaving us teachers. The plants can tell us her story: we need to learn to listen.”

Our History Connects Us to the Legacy Pollution Issues We Face Today!

There were many things that we did not know, understand, or foresee about our mining, timbering, farming, and urban development practices. But we do know now. The environmental, health, and economic, issues connected to the environment are central to our health, the health of our communities, and the world

STUDENT TEXT

WATERSHED STEWARDSHIP

Vocabulary:

Stewardship - the job of supervising or taking care of something, such as an organization or property.

River basin - the drainage area of land where precipitation collects and drains off into a common outlet such as a river, bay, or other body of water.

Watershed - smaller version of a river basin.

Locks - usually consists of a watertight basin known as a lock chamber, which is used to raise or lower the water level as required.

Dam - a barrier constructed to hold back water and raise its level, forming a reservoir used to generate electricity or as a water supply

Consequence - a result or effect of an action or condition.

Pollution- the presence in, or introduction into, the environment of a substance or thing that has a harmful or poisonous effect. Pollution occurs when an amount of any substance or any form of energy is put into the environment at a rate faster than it can be dispersed or safely stored.

Value - the importance, worth, or usefulness of something

Responsibility - the state or fact of being responsible, answerable, or accountable for something within one’s power, control, or management.

Recycling - is the process of collecting and processing materials that would otherwise be thrown away as trash, and turning them into new products.





Language as a “Shaper” of Values

“Braiding Sweet Grass”, Robin Wall Kimmerer,
“Wild Souls”, Emma Marris

Dr. Kimmerer uses the teachings of science and her native heritage to try to understand the world and our place in it. Our language plays a huge role in how we relate to our world. Exploring other languages can help us see a new perspective. Is the language we use, when we describe our world, one of superiority, domination, and exploitation? Or is our language one of kinship, relationship and stewardship for the next generation? In the words of DR. Kimmerer, “In English you are either a human or a thing. I try to be mindful of my language, to be bilingual between the lexicon of science and the grammar of anima-!

Emma Marris stated that “Conservation needs to be about protecting other species with people. It’s about improving our relationships with the nonhuman world.” Robin Wall Kimmerer likes to imagine “that when Skywoman scattered her handful of seeds across Turtle Island, she was sowing sustenance for the body and also the mind, emotion, and sprite: she was leaving us teachers. The plants can tell us her story: we need to learn to listen.”

Dr. Kimmerer wrote, “Children hearing the Skywoman story from birth know in their bones the responsibility that flows between hu-mans and earth. (There are many versions of Sky woman as the crea-tion story was passed from one generation to the other through oral traditions. These teachings were not seen as rules but more of a com-pass and/or a guidance.)”

Watershed Stewardship William Ellis, in his history of “**The Kentucky River**” talks about the first people of the Kentucky River Watershed. For 12,000 years, native cul-tures have inhabited the Kentucky River Watershed (and the greater Ohio River Valley). Historically, they lived in villages of hundreds and sometimes thousands of people. “The early people were drawn to the region for the bountiful wildlife. About 1000 BC the climate patterns were similar to those of today, and the woodland peoples developed new living skills in their environment. They made the first pottery. They con-tinued a lifestyle much like Archaic peoples; however, they began to depend more on gardening, grasses, sunflow-ers, and squash. these were among the important staples in their diet.” **The first people lived in harmony with the natural world.** These native people recycled all their natural re-sources including those obtained from plants, animals, and the earth. An important aspect is how they managed their water resources. They created and maintained sustainable landscapes that provided irrigation to their crops and villag-es. Native Americans were the original environmental stew-ards. They did not let people, or their animals soil the creeks.

Skywoman- An Origin Story

The sky people lived on an island in the sky. One day a preg-nant Skywoman fell through a hole created by an uprooted tree. The story says she fell for a very long time through darkness till she came to see oceans. The animals from this world were trying to understand what they were seeing. Each animal had different gifts. The birds flew into the air and gently caught her and guided her down to land on the back of a giant turtle. The otters and beavers brought mud up from the bottom of the ocean until solid earth forms and becomes Skywoman’s home. She came here and accepted the gifts from the other beings with open hands and used them honorably. She shared the seeds and plants that she brought from Skyworld. Knowing she was pregnant, she un-derstood that she wasn’t building a life just for herself but for the future of her grandchildren. She became the mother of life as we know it today.

There are many versions told through the ages and there are many lessons to be learned and lived by. See another version in Hand Outs , retold by Susan Mullins.



Continued from Sky woman.

In the western traditions there is a recognized hierarchy of beings, with, of course, the human being (the pinnacle of evolution, the darling of creation) on top, and the plants at the bottom. But in native ways of knowing, human people are often referred to as the “younger brothers of creation.” Native people thought that humans have much to learn from their much older brothers, as they have been on earth much longer and have a chance to teach us by example.



Here Dr. Kimmerer gives some thought to water and how we describe it. “A bay is a noun only if the water is dead. When bay is a noun, it is defined by humans, trapped between its shores and contained by the word. But the verb “wiikwegamaa”, (native language for to “be”), describes a bay as a means of releasing the water from bondage and letting it live. If water, land, and a day is used as noun it is static, but used as a verb, the language becomes a mirror for seeing the animacy of the world, the life that pulses through all things, through pines, nuthatches, and mushrooms.” “In English, we never refer to a member of our family, or indeed to any person, as an “it”. That would be a profound act of disrespect. It robs a person of selfhood and kinship, reducing a person to a mere thing. So it is that in Potawatomi and most other indigenous languages, we use the same words to address the living world as we use for our family. Because they are.” These connections can be enlightening and help us navigate a new relationship to science and our natural world. One of enlightenment, respect and stewardship.

Enlightenment:

Dr. Kimmerer's thoughts can help us see how we “modern” people see and relate to our world, and maybe help us see how we might make changes in our relationship to and our studies of the plants and animals with which we share this earth . Can we be better stewards? Can we realize that what is good for a Duskytail Darter (fish), a little Wing Pearly Mussel, a Peregrine Falcon, a Gray Bat, a running Buffalo (Bison), Copperbelly Water Snake, American Burying Beetle, and a Kentucky Cave Shrimp (all endangered or threatened species) is good for us, for our survival? Ultimately, stewardship is our relationship to one another, to plants, animals, waters, air, and land. It involves our relationship with our world and how to be a better member in it.

Here is an example of ways of thinking. Dr. Kimmerer said “When we tell them (children) that the tree is not a who, but an it, we make that maple an it, we make that maple an object; we put a barrier between us, absolving ourselves of moral responsibility and opening the door to exploitation. Saying it makes a living land into “natural resources”. If a maple, is an it, we can take up the chainsaw. If a maple is her, we think twice.” Of course, we need to harvest trees and other materials to build our homes and harvest our food, but can we do it responsibly, respectfully?



The brief history of the Native Americans and the first settlers showcase the different relationships they had with the land and water.



Bisson—National Geographic

Early European settlers began arriving in the Kentucky River Watershed starting after the 15th century. But the migration into the Kentucky River Watershed began in earnest with Daniel Boone. According to William Ellis in his book, **The Kentucky River**, “By the time Daniel Boone and the famous long hunters made their trek into the wilderness in the 1770’s, the outline of much of the area had been mapped.” Boone would have also seen hundreds of buffalo (bison) grazing on cane breaks, which covered dozens of acres of Kentucky River Bottom Land. “By the early part of the nineteenth century, the woodland buffalo [bison] disappeared from the Kentucky River Valley.” Many changes to this rich land of abundance began. This is where some differing philosophies started to take root. Economics became the engine of progress. The land deeds became a tool of ownership of the land. This was a new and foreign concept to the native people. It was a time of change. It was an incredible opportunity for the settlers to realize the hopes and dreams that brought them from Europe to the “new” world.



Re-enactors at Fort Boonesborough

Clean Water Act

In 1972 President Nixon signed into law the Clean Water Act.

At that time air pollution was darkening the skies of our cities, people were getting sick and could not breathe. Some of our rivers were catching on fire because of the chemicals being dumped into the water! The Kentucky River was spared that, but we have other legacy issues. Many of our streams and tributaries do not support the spawning of fish and other creatures. According to Kentucky Fish and Wildlife, they stock the river with fish because some of the small creeks in the watershed are compromised by silt and runoff and cannot support the breeding of native fish.



Dr. Alan Banks summarized the Clean water act for this project.

Under the Clean Water Act of 1972, all streams and waterways in the USA were required to be swimmable, fishable and drinkable by 1985. These words are not precise, but they establish a long held principle. Air and Water are deemed to be in the public trust; they are not private property that can be used or abused as the "owner's" wishes. Anyone who uses these natural resources has a responsibility to the public and to the nation. Air and water belong to all of us. The EPA, a federal agency, is charged with the task of protecting this public trust and provide access to clean air and clean water.

*To assure that this would happen, a federal program called the **NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM** was created.*

You can find more about the national program at: <https://www.epa.gov/npdes> and Kentucky’s role at <https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Pages/default.aspx>

STEWARDSHIP What is it? Let's dig deeper!

So let us think about what stewardship is. It is defined as the job of supervising or taking care of something. If we examine the way we have been taking care of our world through history, it is easy to see that our actions and way of thinking have caused the current state of our environment. It is of utmost importance, and urgency for us to find and enforce solutions and take care of our world responsibly. The solutions can be found in all of us through our actions, our way of thinking, and our attitudes. We must learn that we must live with nature and appreciate its gifts. Most importantly, it is crucial that we nurture nature's gifts instead of exploiting and destroying them. We also must, humbly, appreciate nature instead of battling against it. We must learn from our history to change the course from destruction and exploitation to stewardship and connection to our environment. We must do this in a way that preserves our world for future generations.

"Conservationists are realizing their work isn't about protecting other species from people-although limiting access or harvests, can ,at times, be necessary. Instead, conservation needs to be about protecting other species with people. It is about improving our relationships with the non-human world , not severing them." Emma Marris.

Pool 9 on the Kentucky River



The Kentucky River, a source of drinking water!

The Kentucky River is the source of drinking water for almost one million people. How we take care of the water is an important aspect of stewardship. The Army Corps of Engineers built and maintained the locks and dams on the Kentucky River to support commerce and shipping; environmental issues were not considered at this time. The dams made travel on the Kentucky River safer and more reliable, but the Army Corps decided to reduce the support and maintenance of the infrastructure of the river system as the commercial use of the river was declining. 1981 saw the transfer of responsibilities from the US Army Corps to the state of Kentucky. By 1990 the **Kentucky River Authority** was born. Instead of commerce and shipping, the river became the primary water source for over one million people and their communities, and industries. The Kentucky River Authority established the Kentucky River Watershed Watch to educate citizens and empower them to monitor the quality of their water.



Many people have started to realize that, for the health and survival of our communities, we need to pay attention to this river. The Kentucky River is a valuable resource, and it is necessary for the survival of the land, the people, and animal life. Many people in our modern culture are disconnected from the natural world, air, river, and land. They are not aware of where their water comes from, or of the vital connection clean water has to our health and wellbeing. There are people who live along the river that can see the changes, and they have started telling their stories. Some stories are about the huge fish that used to be in the river, how muddy the water has become, and how flooding has become more regular. Following are some of the pollution issues related to our river ecosystem.

What is pollution?

It is defined as harmful materials being introduced to the environment and contaminating it. Pollution can spread and can have local, regional, and even global impacts.

Overdevelopment, destruction, or pollution of any part of the aquatic system causes a ripple effect that can threaten the entirety of the ecosystem. Hydrologically or ecologically our water is not isolated. What happens on the land and in our backyards affects our water on a scale that goes much beyond just what we see out the back door.

In the context of the river, we not only need to look at what causes water pollution but also other types of pollution that are part of the ecosystem, such as air, soil, land, thermal, and radioactive pollution. We also cannot forget pollution causes ozone depletion, acid rain, global warming, potential cancer in animals and humans, and hazards to wildlife such as increased risk of respiratory and other illnesses.

What can we do? We can protect and/or restore wetlands, forests, intermittent streams, mudflats, riparian zones, prairie pot-holes, and other sensitive waterways that are critical to the health of the river and the health of our communities. We can find ways to responsibly take care of these valuable resources. We also need to enforce the **Clean Water Act!**

Air pollution

Air pollution can be caused by a natural occurrence such as a volcanic eruption that emits toxic gasses. Most pollution is caused by humans, such as: burning fossil fuels, mining operations, and exhaust gasses from industries, factories, and vehicles. Pollution can seriously damage our air, and the impacts range from local issues to planet wide problems such as rising CO₂ levels in the atmosphere.

In some cases, air pollution is visible, but in most cases it is not. Thick smoke coming from a chimney or coal fired power plant is visible. However, sometimes the emissions may not be seen but the effects may be felt when our eyes burn, or we have difficulty breathing. We might not immediately notice any health impacts, but there could be delayed effects that cause health problems or illness in the future.

One example of airborne pollution is mercury. Coal fired power plants and car emissions are the greatest source of airborne mercury. Fifty (50) tons of this deadly poison are spewed into the air each year, just in the United States! Imagine how much mercury must be in the air across the planet! Mercury, and other pollutants, find their way onto the ground and into the water. The EPA (Environmental Protection Agency) has fish advisories for mercury in forty eight (48) states. High mercury levels in the water means it is not safe to eat the fish. Only 1/70th of a teaspoon of mercury is needed to contaminate a 25-acre lake.

What can we do? People cannot stop breathing air or drinking water. We do not want to eat contaminated fish! The air, water, and food belong to all of us! Industries and communities must work together to find solutions! Everyone can do their part by learning about non-polluting practices in our families and homes. Recycle, reduce, reuse! The Clean Water Act is a tool.

We need to enforce the Clean Air and the Water Acts!



Coal fragments that wash in to the Kentucky River.

What happens on the land affects our water.

Water pollution

Water pollution is visible in some instances and in some it is not. The water might look clean but might still be contaminated by toxic pollutants. Water pollution can result from improper sewage treatment, oil spills, and many human activities. Stormwater runoff from highways (salt and chemicals), parking lots, gardens, yards, mining, clear cutting, and farming are primary sources of water pollution. Water pollution can also result from natural processes such as eutrophication (excessive richness of nutrients in a lake or other body of water). This occurs when run-off from the land causes a dense growth of plant life. A vivid example is the dead zone that has formed in the Gulf of Mexico.

What can we do? We have tools that will help! We need to design and modernize our approach to stormwater management and industrial and urban development. We need to stop the problems before they begin! There are many best practices that can be utilized to approach these issues. Straw bales used at a construction site can mitigate sediment and runoff. Mandatory trash pickup can be enforced in all areas. Robust recycling programs can be implemented. Improved filters that remove petroleum and other pollutants from discharges can be used. There are many ways in which science can help us stop pollution. Many family farmers have shown that we can have good, high-quality food without damaging our environment. Many of the farmers understand that an efficient farm that utilizes all the produce, animal waste and plant waste, can nurture the fields for the next season of crops and feed the livestock, family, and community! We can learn from them! Sewage is a huge water polluter. Many community systems are antiquated and cannot handle current demand of the population they service. Every time there is heavy rain, the system can fail. Sewage contains nutrients, total suspended solids, oxygen depleting compounds, pathogens, toxins, and trash. It also contains antibiotics, hormones, steroids, and human and veterinary drugs. All of these can cause havoc in our waterways causing massive algal blooms, dead zones (areas depleted of oxygen), and chemical buildup that cause an array of human, animal, and plant diseases.

Other significant sources include:

**Dumping of solid waste into bodies of water Human and animal waste
Disposing of untreated industrial sewage Agricultural runoff**

What can we do? We can eliminate raw sewage discharge, upgrade systems, and redesign our infrastructure to be more responsive and sustainable.



Soil/land pollution

When harmful chemicals, waste, and/or other man-made substances are dumped onto the soil it can degrade the flora and fauna of the soil and ultimately impair its ability to support life. This pollution is absorbed by the plants, insects, birds, animals, and people. The entire food chain can be affected.

Among Causes are:

- Improper waste disposal
- Oil spills
- Acid rain
- Mining activities
- Farming using fertilizers and pesticides
- Industrial accidents
- Fallout from nuclear accidents (such as Chernobyl) which leave vast areas uninhabitable for several thousand years

Among the impacts are:

- Loss of soil nutrients (makes it unfit for agriculture)
- Increase in salinity in the soil degrades vegetation and natural fauna and flora in the soil
- Toxic dust (such as silica dust) can cause respiratory problems and cancer

Thermal pollution

This can occur when there is a deviation from the natural temperature in a habitat. This happens when the temperatures are increased or decreased in streams, rivers etc. due to water (from factories/industries) being discharged into local water. Other causes include soil erosion, deforestation (the loss of shade exposes water to sunlight and such an increase in temperature), and runoff from paved areas that get hot during the summer. This temperature change often affects animal and plant habitat which, in turn, affects the life that relies on it. The water might become uninhabitable and be lethal to certain life forms

There are natural causes of thermal pollution, such as geothermal vents and hot springs that release water with excess temperatures.

Radioactive pollution

This refers to pollution that contaminates living organisms and their environment because of the release of radioactive substances. This can occur during nuclear explosions and accidents, testing of nuclear weapons, mining of radioactive ores, or handling and disposal of radioactive waste, fracking, etc.

Plastics

During modern times, people most certainly have enjoyed using plastic in its many forms! It is cheap to make and has lots of uses, besides being convenient. Unfortunately, much of it is designed to be used only once and is then thrown away. So why is this so bad for the environment? Information from the United Nations Environment Program (UNEP) states that plastic pollution amounts to 400 million tons per year, and it is estimated it will double by 2040. The same source states that every minute of every day a truckload of plastic is dumped into the ocean! It takes plastic about 400 years to decompose (break down), which is a very, very long time. Plastic that is thrown away on land is often washed and blown into our oceans, rivers, and creeks.

We acknowledge that some plastics are very useful to our modern lifestyle, such as airbags in our cars, bike helmets, and medical supplies. What is most problematic is the single-use-plastic, which, according to National Geographic for Kids, makes up more than 40% of all plastic trash!

So what is the impact when plastic ends up in the ocean? National Geographic for Kids, United Kingdom, and the United Nations Environment Program reported the following facts:



United Kingdom, and the United Nations Environment Program reported:

- Seven hundred (700) different species of animals are believed to be severely threatened because of plastic pollution in the ocean.
- Huge amounts of carbon dioxide, CO₂, is absorbed by the ocean each day to deal with the trash dumped into the ocean. The ocean has always naturally sucked up CO₂, but the trash has caused a drastic increase in absorption. This makes the water more acidic, which in turn makes it harder for fish to breathe and for creatures like crabs, lobsters, and coral to grow their shells.
- Ten percent (10%) of all dead animals found in beach cleanups have been entangled in plastic bags. A large number of animals are found trapped by marine fishing debris, such as old ropes, nets, and mesh wires.
- Five trillion pieces of plastic are estimated to be floating in the world's seas.
- Ninety percent (90%) of seabirds eat plastic rubbish, mistaking it for food and 52 % of sea turtles worldwide have accidentally eaten plastic rubbish in the ocean.
- Rivers carry a lot of plastics that pollute the ocean.
- There could be more plastic than fish in the ocean by 2050.
- One million plastic bottles are bought every minute.
- Ninety-nine (99%) of seabirds will be eating plastics by 2050.
- Under 10% of all plastics are recycled.
- Over two million plastic bags are used worldwide every minute.
- Seventy percent (73%) of beach litter worldwide is plastic.

Microplastics are small plastic particles less than 0.2 inches (5mm) long, according to the National Oceanic and Atmospheric Administration (NOAA). The average person eats and inhales approximately 70,000 microplastics each year. This breakdown into tiny particles is a slow process. It slowly enters our environment and the food chain. These sesame seed sized plastic pieces (and microplastics) float in the ocean every day. In 2014, based on the estimation of researchers, there were already 51 trillion pieces in the ocean, with more added every day. This is more than the stars in the Milky Way by 500 times, as reported by NOAA.

REMEMBER:

As stated before, pollution does not just affect areas near polluting industries, mines, etc. Its effects can be region wide, country wide, continent wide, and worldwide. It is important for us, and our fellow human partners, to rethink how we live on this earth. We can rethink how we garden, how we use and protect our bodies of water, and how we design and shape our natural and public spaces. There is a world of opportunity to make this a better place for everyone, including the plants and animals. But we must make choices! Remember, when the plants and animals are healthy that means the environment is healthy for us too! We need to work with nature, not be in a battle against her. Such thoughts and actions could affect our Kentucky River Watershed and could have wide reaching effects, for the good. We need to look forward if we are to become the good stewards our land and water needs.

STEWARDSHIP ACTIVITIES:

What can we do? PLENTY!

- We can limit or try to eliminate the use of single use plastics. If we use them, we can find more than one use for them (repurpose, recycle, refuse). We can make sure they do not wash or blow into our creeks, streams, and rivers.
- In some countries the use of single use plastics is already illegal, showing that it is possible to do without them. We can join or start efforts to do that in our country
- Do not use plastic straws (animals could mistake the pieces as food). You can use reusable straws made from bamboo, metal, or glass, or even get in the habit of drinking without straws whenever possible.
- Use a reusable water bottle and fill it up with water from a tap or water fountain instead of using bottled water whenever possible.
- Avoid plastic bags. Bring your own reusable shopping bags to the store.
- Snack on fruit instead of chips or packaged sweets you will help your body and the environment.
- Make “green goody bags” instead of buying plastic yo-yos and other plastic toys, ask your parents to make (maybe with your help) some homemade tasty treats and give eco-friendly gifts such as paper notebooks and flower seeds.
- Eat your ice cream from a cone instead of using a disposable cup and spoon.
- Never litter!
- Pay attention to what goes into the river! What happens on the land will get into the water! Participate in water testing with the Kentucky River Watershed Watch.
- Participate in river, creek, roadside, and neighborhood clean ups!
- We can eliminate raw sewage discharge, upgrade systems, and redesign our infrastructure to be more responsive and sustainable.
- Our Industries, our communities, and our family practices, should stop polluting! Recycle, reduce, reuse. The Clean Water Act is a tool. We need to enforce the Clean Water Act!
- Have garbage pickup and recycling programs in your school and town so that trash is not washed into our creeks, streams, and rivers!
- Educate yourselves and your families about the importance of recycling, reuse, and reduce!
- We need to design and modernize our approach to stormwater management and industrial/ urban development, to stop the problems before they begin. What can we do? We have tools that will help! We need to design and modernize our approach to stormwater management and industrial/urban development. Best practices as simple as replacing and protecting riparian zones, protect and repair wetlands, straw bales at a construction sites to block sediment, to mandatory trash pickup, robust recycling programs, to complicated filters to remove petroleum and other pollutants from discharges.
- Get products from local, family farmers who have demonstrated that we can have good, high-quality food without damaging our environment.
- We need to rethink how we live in nature. According to native teachings we must live as if our children’s future matters, take care of the land (and water) as if our lives, both material and spiritual, depend on it.

END STUDENT TEXT

ACTIVITIES

- 1. Brainstorm** as a class what your school could do to become more “earth friendly”. Could you pick up trash on school grounds, recycle, draw a poster? (Use the handout on how to design effective posters!) Make a PowerPoint presentation of stewardship activities and present in a school assembly
- 2. Discuss different stewardship activities** (some are included in this curriculum) and complete the “Windsock” featuring 10 stewardship activities that you could and would do. Display the windsocks around the school and then take yours home. Share the stewardship activities with your family and ask your family if they can commit to at least one! (see directions for the **windsock** in the RESOURCE section).
- 3. Design a poster or a pamphlet** that illustrates one kind of pollution, outlining ideas and solutions. (Suggestions for an effective poster are in the RESOURCE section)
- 4. Stage an interview** with classmates (with individuals and members of cooperative learning groups). You are a TV reporter who has been assigned to make a documentary series about pollution. Talk about the different kinds of pollution given in the chapter and discuss ways to address them. Do not forget to address the dilemma with plastic waste!! You can film the interviews and share at a school assembly.
- 5. Create a poster/or pamphlet** to teach people about stewardship of the water and the watershed. What is stewardship? What is pollution and what can we do about it?
- 6. Write a story about an animal or fish** (create a fictional character) from the watershed. Identify a problem they might have in their environment, such as siltation of the creek and how it might affect a fish character. How? What could be a solution? Empower them to act. What might the action be?
- 7. Make a poster of Skywoman** falling through space or landing on the back of a giant turtle. What other animals can you think of from this water shed? What “gifts” would they bring? Example: a squirrel, might bring some gathered nuts and seeds? You might include one of your own poems. The story is available as a printout version in the RESOURCE section. Get helpful hints on how to create an effective poster from the handout in the RESOURCE section.
- 8. Write a poem** - choose to write a sensory poem, an acrostic poem, a haiku poem, or write your own kind of poem (see the rules and examples of poems mentioned here in the RESOURCE section).
- 9. Test your water** and record what you find. You could test water from a fish tank, creek water, water from your tap, or water from other sources. You can get simple water testing strips from the local pet stores, department stores, pool companies and home hardware stores and the internet. Contact the **Kentucky Watershed Watch**, the **Kentucky Riverkeeper**, and the **Kentucky division of Water**, for a volunteer classroom presenter. **Training for water testing**. You/students can receive training from the Kentucky River Watershed Watch and the Kentucky Riverkeeper, to help monitor your local stream, creek, or river. Know what is in your water!
- 10. Writing-** Pretend to go to the riverbank and tell Eluama about the different kinds of pollution that you have studied and ask her what she might have experienced You could also tell her about some various stewardship activities you plan to do. You might ask her to “suggest “some stewardship ideas. You could also talk to her about the Skywoman story. Write your conversation as an ELUAMA story.



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It will
take all of
us trying
really,
really
hard to
clean up
our world!



4. Kentucky River Watershed and Habitats

Pat Banks and Roberta Hounshell



"The land is our mother, nourishing all of her children, beasts, birds, fish, and all men (women and children).

Native American QUOTE

"The woods, the streams, everything on it (earth) belongs to everybody and is for the use of all. How can one may say it belongs only to him?"

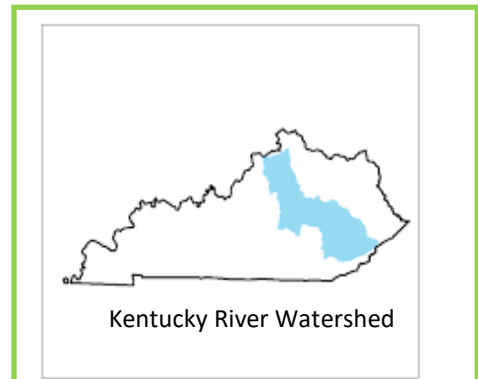
Native American Quote

Thoughts on the Kentucky River Watershed and Habitats.

We feel that the study of the watershed and habitats are connected. The health of the watershed directly impacts the habitats of creatures great and small. What we must come to realize is that our health and well being is also dependent on the health of the watershed and habitats. We are connected in the most basic, intricate, and intimate ways.

The Kentucky River Watershed has been described as rainforest, the streams and rivers have been a source of plentiful, healthy, nourishing fish for thousands of years. In the last two centuries we have lost some critical habitat and experienced the extinction of plants and animals. The Kentucky Fish and Wildlife annually stock our rivers and lakes with a variety of fish because the breeding grounds have been compromised.

In 1973 The Endangered Species Act was passed by the United States Congress. This powerful set of laws serves to prevent the extinction of plants and animals .



Kentucky River Watershed



Blue Gill

Kentucky River Watershed and Habitats

Grade level: 3-8

Time: 2 periods (additional time is required to complete one or more of the suggested activities)

Unit Objective: To discover the Kentucky River Watershed through History, Science, Art, Culture, Conversation, Recreation and Education

To develop an understanding of the need for, and the nature of, stewardship activities for the Kentucky River Watershed as it relates to the conservation of the habitats and the watershed.

Lesson Objectives:

- Students will be able to describe the main features of the Kentucky River watershed the features of Kentucky's main habitats and how they connect to them and the watershed.
- Students will be able to describe stewardship activities connected to the watershed and the habitats and how disturbances in habitats can lead to species becoming threatened, endangered, or even extinct.
- Students will be able to describe some animals Eluama meets in the story "Eluama Meets Animals on the River". Students can describe and sketch them in their journals: River Otter, Bobcat, Blue Heron, and /or others in the habitat.



Sassafras, Frog, River Otter and Yellow Ring-necked Snake.



Witch Hazel and Bobcat (wild Cat)



Spice Bush and Blue Heron



Thoughts on Watersheds and Habitats by Mary Hufford, PHD

We call the river and its tributaries a “watershed.” But how is water actually “shed”? The shape of a river extends to the very tippy top of its headwaters where water collects. On the Cumberland Plateau, water collects in every little wrinkle and groove, drawn by gravity on its journey toward larger tributaries. Intermittent streams, seeps, and drains are mapped as “flowlines” and an image of thousands of flowlines on the Cumberland Plateau looks like a giant human brain! ([See enlarged portion of KR flowline map](#))

The collection of water begins even before it hits the ground, as the mist from clouds and drops of rain travel along veins of leaves to the edges, producing what is called “throughfall.” Maybe you’ve experienced throughfall after a rain when a shaken tree branch gives you a shower. Drops of water are also routed toward the earth through pathways in tree bark, channeling what hydrologists call “stemflow.” Distinctive patterns marking bark and leaves veins play a role in delivering water to the forest floor, where it is conserved by the trees themselves. Water collects at the base of trees is rich in nutrients and is held close to the trees by colonies of moss. Processes of stemflow and throughfall are vital contributors to the health of the Kentucky River. Forester Peter Wohlleben describes trees as “standing rivers,” an image that suggests headwaters actually begin at the treetops! Did you know that leaves of plants influence the shapes and patterns formed by drops of water landing on them? For example, Jewel weed, a plant that grows by the water is called jewel weed because water immediately forms small beads, as if the plant were studded with jewels. Another name for jewelweed is “neverwet” because the leaf remains dry when shaken free of its jewels.

Such patterns play a role in shaping headwater habitats, where seasonal flows of water leave some creeks dry for long periods of time. These bodies of water, called “ephemeral” or “intermittent” streams, support habitats that are crucial for creatures dependent on them. For one thing, being dry part of the year means that fish can’t live there. Insects, crustaceans, and amphibians that play a key role in the regeneration of headwater habitats can do their important work of shredding, decomposing, and breaking down fallen leaves and branches into soil. Flourishing around fishless waters, crawdads, salamanders, and benthic invertebrates like mayflies, stoneflies, and caddisflies become food for other creatures like birds, turtles, and frogs.

One kind of frog that loves temporary waterways is the wood frog, the first frog that may be heard in the early spring on the Cumberland plateau. In late February or early March you might hear what sounds like a flock of migrating ducks. If you follow the quacking sound you may arrive at a pool of water – sometimes called a vernal pond – where many male frogs have gathered to create a “lek.” Lek comes from a Swedish word for “matrimonial ground.” It seems that Froggie *does go a-courtin’* like the song says. The male frogs call to let all of the female wood frogs in earshot know that the spring lek has begun. Heavy with eggs, the females make their way through last year’s fallen leaves, following intermittent flowlines to join the lek, where the males will help them to lay their eggs, fertilizing them as they emerge. Very few of the eggs will become frogs, for much of the egg mass supplies a springtime feast for salamanders, crawdads, and last year’s tadpoles. Listed as species of greatest conservation need under [Kentucky’s Wildlife Conservation Plan](#), wood frogs are one reason to protect the health of intermittent headwaters.

How many names can you think of for places where water only flows after a snowmelt, or a heavy rain? How do these places that are sometimes wet and sometimes dry support local wildlife? Do you look forward to hearing spring peepers calling from these places? How is the water managed? Where does it go?

PROCEDURE:

1. Pre- assessment: Conduct a brainstorm session with the group. Ask what they know about habitats, and what different habitats we have in Kentucky. Ask students to describe a watershed. Ask what they know about endangered species in our watershed and state. What do they think some of reasons are that species become endangered. Ask what animals live in the watershed. Ask if they know what they might do to improve habitats (stewardship activities). Incorporate the main vocabulary into the brainstorm. **Record answers electronically or on a chart so that the answers can be revisited for the post assessment.**

2. Print out student text (or display on student devices). Start with the discussion of the Wendall Berry quote. The class can read the quote out loud, or teacher can read it to the class. The teacher could also aide in understanding of the quote by paraphrasing it. Discuss with the class what they think the quote means and record answers for post lesson discussion. How do students think we have to change our thinking? How does stewardship play into this?

3. Read the text explaining the different Kentucky Habitats (Students read independently, out loud or teacher reads text out loud- discuss with the students what the features of the various habitats are.

4. Read the ELUAMA story (students read out loud taking roles or teacher reads out loud) and have students describe the animals that introduce themselves in the story.

5. WRITING: Add to the Eluama story in this chapter. The story in this chapter introduces some animals that can be found in the Kentucky River watershed. Research and add the description of a fish (suggested: Kentucky Arrow Darter) or other animals or plants that can be found in the watershed. Add Chapter 2 to the story and research and describe the habitats of the animals featured in the story. Also add their preservation status. Students could use the publication from “Kentucky Fish and Wildlife- Wildlife Diversity” (<https://fw.ky.gov/wildlife-diversity>). Make a google query: Wildlife diversity + Kentucky Department of Fish and Wildlife). The publication has information on animals that endangered and threatened in Kentucky.

6. Complete the Habitat Simulation activity as a class. Discuss with the class what they learned. How can stewardship activities influence the outcome?

7. Discuss the terms “threatened, endangered, and extinct”. Look at the list in the student text and discuss if they have heard of any of these species. (In further research students can select one species and find out what led to the status listing!!!) What stewardship activities could make changes for the species in the future and even improve the status?

8. Discuss the following comprehension questions if the content has not already been discussed:

- What are the main features and borders of the Kentucky River watershed, see map in RESOURCES. Describe the features of Kentucky’s main habitats and how are they connected to your lives?
- What stewardship activities could positively influence or reverse some of the disturbances in impacted habitats and potentially prevent a species from becoming threatened, endangered, or even extinct.
- Students will be able to describe some of the animals from the watershed as Eluama meets them in the Story “Eluama Meets Animals on the River”. List, sketch and describe them in their journals: River Otter, Bobcat, Blue Heron, others.
- Discuss potential points that came up in the pre lesson brainstorm activity that have not been addressed.

NOTE: Using cooperative learning strategies as part of the lesson is highly encouraged. If teachers are not familiar with any such strategies, see the COOPERATIVE LEARNING STRATEGIES handout in the RESOURCES section. Several strategies are included. Strategies should be taught and practiced prior to use.



9. Post lesson assessment: (depth and extent of the assessments are at teacher discretion to match student need and ability) We encourage the creation and use of student journals. See **RESOURCES!**

Students discover and list the main habitats in Kentucky from this lesson in their journals: forests, prairies, wetlands, caves, backyard habitats. In your journal, draw or sketch one creature and one plant from each habitat. Use field guides for reference.

Students write a few sentences about what they concluded from the SIMULATION activity. The class could discuss a summary and it could be written on the board for students to copy, or complete independently.

Students list at least ONE stewardship activity with this lesson.

At teacher discretion additional activities can be completed and evidence documented in student journals. Additional activities are listed below.

NOTE: Activities are not included in the student text. These are at teacher discretion. Teachers might want to select one of the activities to be completed as a class, assigned to individual students, or as an activity for cooperative learning groups. The student or groups can share their findings with the class after the completion of the activity!



Dandelions, Grasshoppers and Humming Birds

Wild Edible Flowers and Greens

Green Salad

Early spring in the Kentucky River Watershed is the perfect time to pick greens from your yard or field! Generations of native people and settlers have foraged for these spring gifts from nature. These wild plants were the first fresh vegetables that they would have had after the long winter of dried and preserved foods.

It is important to collect these greens with an experienced forager and/or a pictorial field guide. Foraging area should also be pesticide free. These plants are sweet and tender in the early spring while young! Pick a handful of each of these plants. Wash well in cool water and pat dry. Wrap in damp paper towels and place in the refrigerator till ready to make your salad. You can also just add a few of these greens to your “store bought” lettuces.

Dandelion Greens	Red Clover
Mint (any variety)	Fiddle Head Fern
Ramps (wild leeks)	Nettle
Chickweed	Lambs Quarters

Simple Dressing

Juice from 2 lemons (or 1/4 cup of cider vinegar)
 Salt and pepper to taste
 ½ teaspoon honey
 ¼ cup of olive oil (add more to taste)
 Whisk to mix or shake in a lidded canning jar.

Edible Flowers

These flowers can be added to any salad as they blossom throughout the spring and summer. If a blossom has a white base, cut it off as it might be slightly bitter. These colorful flower petals add beautiful color, vitamins, and minerals to any green salad. As with the greens gently rinse in cool water and pat dry. Wrap in damp paper towels and place in the refrigerator till ready to make your salad. You can also just add a few of these flowers to your “store bought” lettuces.

Daylily	Pansy
Squash blossom	Rose
Marigold	Lavendar
Nasturtium	Tulip
	Violet (there are other edible blossoms too)

START OF STUDENT TEXT

Kentucky River Watershed and Habitats

Quote: Wendell Berry *"We have lived our lives by the assumption that what was good for us would be good for the world, we have been wrong. We must change our lives so that it will be possible to live by the contrary assumption, that what is good for the world will be good for us. And that requires the effort to know the world and learn what is good for it."*

Kentucky River Watershed and Habitats

Many books and accounts about Daniel Boone's trips to Kentucky refer to the incredible variety of plants and animals he found in abundant numbers in the Kentucky River watershed when he first crossed the Cumberland Gap.

Now a lot of animal and plant diversity can still be found in the Kentucky River watershed, but some habitats have been lost and some of Kentucky's plants and animals have become threatened and endangered.

In 1973 The Endangered Species Act was passed by the United States Congress. This powerful set of laws serves to prevent the extinction of plants and animals.

The criteria that the U.S. Fish and Wildlife Service consider in the decision to list a species are:

- the present or threatened destruction, modification, or curtailment of its habitat or range.
- overutilization for commercial, recreational, scientific or educational purposes.
- disease or predation.
- the inadequacy of existing regulatory mechanisms.
- other natural or manmade factors affecting its continued existence.



Vocabulary:

WATERSHED: An area or ridge of land that separates waters flowing to different rivers, basins, or seas and collects in a defined area.

HABITAT: The place where a plant or animal lives that supports/provides food, water, shelter, and space. **ENDANGERED:** Species in imminent danger of extinction throughout all or a large part of their range. **THREATENED:** Species that are likely to become endangered within the foreseeable future.

ENDEMIC: A plant or animal restricted to a particular area, region, or river system

RELICT: A plant or animal species living in isolation in a small local area, or as a remnant of an almost extinct group.

EXTIRPATED: Species that have disappeared from Kentucky but still exist elsewhere.

EXTINCT: Species that no longer exist.

The Kentucky River Watershed and Habitats

are ancient. There have been ice ages and ancient seas. The rocks, geodes and layers of slate, coal and sandstone tell the ancient epochs and histories of the region. There are trees hundreds of years old that grow on hillsides, in valleys and wet-lands. They provide food, seeds, leaves, fruits, and shelter for many animals. Some of trees include walnut, persimmon, oak, maple, cedar, and pine. The grasslands were/are vast and have wildflowers, vegetables, and herbs. The net-work of springs, creeks, streams, and rivers are numerous. This watershed sup-ports multiple habitats that support deer, bison (buffalo), squirrels, raccoons, foxes, bears, woodpeckers, eastern bluebirds, cardinals, yellow finches, robins, bats, ring-necked snake, black snake, copperhead snake, box turtle, snapping turtle, snails, grasshoppers, lighting bugs, mudhoppers and a vast number of butterflies and moths. The trout, paddle fish, catfish, gar, and bass once filled the waters in abundance. Bats and birds' nest on the rocky palisades and rock cliffs. (See the endangered species listed below) People have lived in this watershed habitat for thousands of years!



What is a Watershed?

A watershed is the area of land where all the water that is under it or drains off it, gathers into the same place. We can look at a creek watershed, river water-shed etc. To get a basic idea how this works, crumple up a piece of tinfoil. Spread it out a little and lay it on the table. It should look like mountains and valleys. Now using a sprinkler watering can, observe how the water flows. Do you see different places that the water collects? What is in the air and on/in the land effects the quality of water in the watershed. For this lesson we are focusing on the Kentucky River Watershed. Watersheds can have many habitats!



What is a Habitat?

A habitat provides a sustain place to live, eat and sleep for a variety of plants and animals. They all have important “jobs” and or “services” for each other. A healthy habitat can sustain life as part of the cycle of life.

Terrestrial habitat types include [forest](#), [steppe](#), [grassland](#), [semi-arid](#) or [desert](#). [Fresh-water](#) habitat types include [marshes](#), [streams](#), [rivers](#), [lakes](#), and [ponds](#). [Marine](#) habitat types include salt marshes, the coast, the [intertidal zone](#), [estuaries](#), [reefs](#), bays, the open sea, the sea bed, deep water and [submarine ven](#)

Changes in a habitat may include violent events (such as the eruption of a [volcano](#), an [earthquake](#), a [tsunami](#), a [wildfire](#) or a change in oceanic currents); or change may occur more gradually over millennia with alterations in the [climate](#), such as when [ice sheets](#) and [glaciers](#) advance and retreat, also different weather patterns bring changes of [precipitation](#) and [solar radiation](#). Other changes come as a direct result of human activities, such as [deforestation](#), [min-ing](#), the [plowing](#) of ancient grasslands, the diversion and damming of rivers, the draining of marshland and the dredging of the seabed.

A habitat can be as small as a shell or as large as the whole world. We are going to look at some of the habitats and the inhabitants of the Kentucky River Watershed

General Habitats in Kentucky:

Each of these habitats have multiple specialized places that allow for special creatures to flourish. As an example, the north side of a mountain will support a slightly different forest than a southern slope. That has to do with seasons, the time of frost and the budding of new growth. Maybe there is a cave or rock face in a forest that would allow birds or bats to thrive or fish to adapt to the darkest cave?? There is often variety in a habitat. *KENTUCKY has lost many of its native habita. Hhabitats native to Kentucky are:*

The Kentucky River Watershed. Many habitats have *experienced a decline. Many of our creeks and streams do not support the spawning of our native fish. The EPA, Environmental Protection Agency, estimates that mountaintop removal “valley fills” are responsible for burying more than 2000 miles of vital Appalachian headwater streams. This is where many of the native fish spawn.*

Forests: Almost half of Kentucky is covered by forest, consisting of oak and hickory trees with the most common species being red maple. *We have lost whole forest ecosystems to mountaintop removal, clear cutting, urban development, and farming.* Most of the forests are in the hands of private owners. These are mostly found in the Cumberland Plateau region west of the Appalachian Mountains.

Prairies: Once Kentucky had 2-3 million acres of prairies and savannas, but now only 1% are left. These habitats were home to American bison and elk.

Wetlands: Kentucky is bordered by rivers on three sides (Ohio, Big Sandy, Tug Fork) and with extensive wetlands in the floodplains of the Mississippi and the Ohio Rivers. These flood plains, in western Kentucky, were impacted by coal mining and ecologically damaging agricultural activities. This part is called the Jackson purchase and was rich with bottom swamplands. The Chickasaw Indians purchased this area in 1818.

Caves: Caves can be found in most parts of Kentucky, Carter Caves in eastern Kentucky, and the Pennyroyal Plateau, with its rolling hills is home to Mammoth Caves. This is an extensive cave system in western Kentucky. Animals found in cave ecosystems are: Troglodytes (Greek, meaning troglodytes = cave, and xenos = guest), such as bats and moths. Typically, they use caves only to hibernate, nest, or give birth, they do not spend their entire life in caves. Trogloniles (Greek, troglon = cave, phileo = love) Examples are crayfish (and other crustaceans). These can live in caves for part of their lives or live entirely inside the cave or outside the cave. Troglonites (Greek, troglon=cave, bios=life) cave shrimp. They are adapted to survive in total darkness. They can only survive in their cave system. They can-not even travel between cave systems.

Backyard Habitat- Our own backyards are habitats. In our habitats we could have trees, grass, forest, gardens, field, creeks, and or caves. Each of your habitats might/will be different from your classmates. Describe the different features of your habitat in your journal.



Writing, research, descriptive notes and illustrations: Research, illustrate and describe at least 3 fauna. These include fish, animals, insects, butterflies, bees, clams, snails, bats, reptiles and or birds. Describe and illustrate at least 3 flora (plants) that can be found in their Kentucky River watershed habitat. Research the preservation status. Students can use standard field guides for the above creatures and plants in the region and the “Kentucky Fish and Wildlife- Wildlife Diversity” (<https://fw.ky.gov/wildlife-diversity>.) The KFW publication has information on animals that are endangered and threatened in Kentucky including some of the reasons why they have that status. Some mitigation or corrective plans for actions are completed or in progress. See: Kentucky Monarch Conservation Plan posted on the Kentucky Department of Fish and Wildlife website: <https://fw.ky.gov>. Google search: Kentucky Monarch Conservation Plan. Add to your journal.

Example: To make a good sketch observe the details of your subject. What is the shape and contour of the body? Does your animal have feathers, scales or fur? What colors do you see? Observe the detail sketches of a feather, beaks etc...

		<p>Habitat: The cardinals habitat ranges nearly half of the United States and a variety of habitats. They range from the Kentucky River watershed, woodland edges, thickets, hedgerows to desert scrub habitats.</p> <p>Habits: Cardinals do not migrate. When the weather gets cold they look for shelter in dense thickets.</p> <p>Diet: Mostly seeds, insects and berries.</p> <p>Description: Male cardinals are red with a black mask and orange beak. Female cardinals are pale brown with redish tinges with a black mask and orange beak.</p>

Draw three plants from the Kentucky River Watershed. Where are they found? Are they edible? If so who eats them? Describe them and see if you notice things you might not have noticed before. Be a sci-entist and an artist! You can sketch with pencil, color pencils and paint or pastels. Keep the sketches simple or add detail it is up to you!



Blackberry :The Blackberry is an edible fruit. It is eaten by many animals, birds to bears to people. It ripens in July and has a sweet tart taste and is full of vitamins.

Family: Rosaceas

Genus: Rubus

Description: Blackberries have biennial canes, thorns on stems, compound leaves usually to five oval, coarsely toothed stalked leaves. The flowers in spring are usually white and or pinkish. The berries range from black to deep purple. The berries are technically aggregates of drupelets. The drupelets are attached to a juicy white core.



ELUAMA Meets Animals in the Kentucky River Habitat/Watershed

Roberta Hounshell

It has been a beautiful day on the Kentucky River. There were lots of people boating and fishing, but now it is quiet. Eluama has decided to surface where she can splash. The riverbank is quiet, all she sees are some big sticks and some feathers on top standing stock still on the bank. Eluama watches, but sees no movement. She starts to splash and roll in the water. It feels great. Suddenly, there is a loud chirp. It comes from the sticks with the feathers.

STICK THING (later identified as a bird): "What are you doing? I am trying to get my dinner and you are spoiling it with you noise and splashing! Stop it!"

ELUAMA: "I am so sorry. I did not know you were alive; you did not move. I have never seen anyone like you here. What are you? You have such long legs. By the way, I am Eluama, and I live in the Kentucky River."

BIRD (BLUE HERON): "Oh I see. I am a bird, a Blue Heron. I have long legs, because I like to wade in shallow water of all kinds to get my food. But today I have not eaten yet and I am hungry!"

ELUAMA: "Why are you here? I have never seen you here before. Have I just overlooked you?"

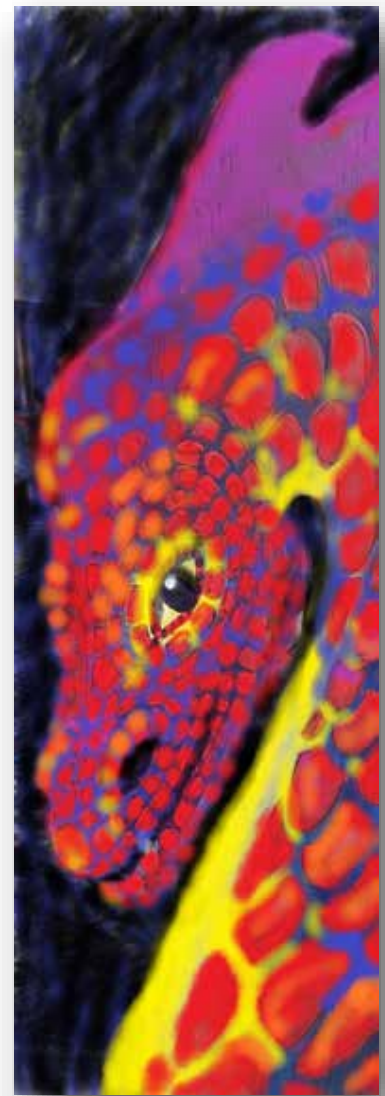
BLUE HERON: "No, this is my first time right here, but let me tell you my story. I live all over North America, some herons live in Central America or the Caribbean and some other areas. We live near any kind of water where fish are plentiful! I adore eating fish, all kinds, so satisfying. I have long legs because I mostly like to catch the fish by wading in shallow water. I once found a lovely place next to a house with a huge fishpond. Nice, fat fish!! The people came out and fed the fish every day. What a life those fish had. Then I had an idea: I could help the people by eating some of the fish. Then they would not have to feed them! That sounded like a great idea to me, but the people did not like it. The first few days were great, but then, suddenly, they realized I was fishing in their pond. They came out and yelled and tried to chase me off. They scared me to death with some noisy machine, so I took off and landed right here. Go figure? I usually stand very still and strike with my beak when I see fish, but somehow the water is too deep here".

ELUAMA: "Can I help? I do not like to be hungry, either."

BLUE HERON: "I am just off to where the water is not as deep. I heard of a place called Otter Creek." Bye. It was nice meeting you, but I am soooooo hungry."

Before Eluama can say anything else the Blue Heron takes off. Eluama continues to swim along and observes the grass move along the riverbank. By now it is dusk, and the light is getting lower. Eluama cannot identify what is moving. She calls out: "Hey you, who are you? Can you not see me or hear me?? Can I meet you?" Eluama does not get an answer, but the movement continues. She shouts again: "I am Eluama and live in the Kentucky River. I just want to make some new friends. Who are you?"

The animal stops and comes out of the grass. It has beautiful spotted fur with a reddish-brown streak pattern that fits in so well with the surroundings. It now stands at the riverbank and looks straight at Eluama with greenish yellow eyes, and ears tufted with black hairs.



*See your Kentucky
river water shed through
the eyes of a magical
creature .*

*Her name is Eluama. She
took that name from the
first
peoples languages.
Her name means:
Beautiful Water!*

ANIMAL (BOBCAT): “Of course I see and hear you; I can even smell you. I am known for my acute abilities in those areas. I have seen you before, as I have a rock crevice close to here and some hollow logs along the river. Those are my favorite places to observe my territory, I can sit here for hours. I am a Bobcat and I like to stay out of sight as much as possible. I am considered a predator as I am a very good hunter. People like to hunt me to make coats and hats out of my fur. I have heard that the people around here have a sports team they named after me: The Kentucky Wildcats. I have heard people talking about the team when they relax on their boats and are anchored close to the shore. I have observed and listened from my safe hiding places. I heard how people have pictures of me all over their houses, which is great. To my horror, I also heard that some people like to keep me whole and stuff me and show me off in their houses. That is enough reason for me to stay out of sight and carefully choose who I want to meet.”

ELUAMA: “I can understand that. I like to stay out of sight, too. We have that in common. Will you tell me about yourself?”

BOBCAT: “We can live in different places such as mountainous areas with rocky cliff lines, brushy field edges next to forestland or like me, in the bottomlands of rivers. I need a large area to roam though and I strictly eat meat. I love mice, rats, rabbits, opossums, birds, insects, reptiles, deer, beaver. I have been suspected of attacking pets, like dogs and cats, but I never do that, neither do my Bobcat friends. We rather enjoy stalking our prey patiently and then pounce!!! Some of the animals do not realize how fast we can be and that we can climb trees and swim very well. I am a good hunter. Some say we help balance nature. I enjoy the hunt and take my time. Our young kittens are vulnerable to other hunters like hawks, owls, foxes, and coyotes. Their mother helps keep them safe and teaches them to hunt.

ELUAMA: “Oh, my family is all of you, I do not have a specific family.” I do not mind being alone most of the time, but I do enjoy making friends and spending some time with them. Thank you for coming out of the grass to meet me. I have met many fish in the river, and my best friend is Equoni, the River otter. I think you and I have our solitary natures in common and I would like to visit you every so often!



Witch Hazel and Bobcat



Spice Bush and Blue Heron



Sassafras, Frog, River Otter (Equoni) and Yellow Ring-necked Snake.

BOBCAT: "Yes. That would be great." Bye for now. Sometimes you might hear my screams echoing through the woods, which might sound scary, but you know who it is now. Bye, I must go."

ELUAMA: "See you next time, Bobcat. " Eluama continues her swim and splashes around, thinking about the new friends she made. Suddenly there is another splash next to her. Well, it is Equoni, her otter friend.

ELUAMA: "Hi, Equoni, it is good to see you. I just made some new friends; do you want to hear about them?"

EQUONI: "Yes, but I was your first friend here. I always want to remain special to you, please!"

ELUAMA: "Of course, Equoni. You will always be my first and best friend. So I will tell you about my new friends but I would love to learn more about you too! Will you tell me about you?"

EQUONI: "Yes, of course, I would love to. So, I am a river otter, but you know that already. You have already seen my brown fur (some of us have more gray fur) and my lighter, silvery colored belly when I swam on my back. My beautiful course outer fur is waterproof and the soft underfur helps keep me warm in cool water. My tail is flat and muscular and it helps me swim. I am a strong and agile swimmer. I can dive down to 36 feet, again with the help of my strong tail. I have short legs and webbed feet with some claws that I can use to defend myself, if needed. That is so much about me, do you want to hear more?"

ELUAMA: "Yes, I do, please go on. What do you eat, for example?"

EQUONI: "I am a meat eater. I like to eat fish, frogs, crayfish, turtles, insects, even some small mammals, like mice. I can get food on land and in the water, that is good, because I need lots of food due to my high metabolism. The whiskers on my face also help me locate prey. Once I have caught something, I usually carry the prey in my mouth, but I can also use my thumbs and forepaws to catch food. My teeth are good and strong, and I can crush and grind what I catch. There is something very special about the way I can use my voice. I can communicate with my otter friends using my voice, I could be a voice actor with my ability to whistle, buzz, twitter, chuckle, chirp, and growl. My scream, when I am scared and when I am threatened, is hair raising and can be heard for a mile and a half!!! I deserve the Oscar of the animal world for that!!"

ELUAMA: "Other animals have told me they have some good screams. There could be a great competition to see who is best."

EQUONI: "Yes, Eluama, I am always ready for a contest. But I would like to share one more thing about myself, please."

ELUAMA: "Sure, what is it?"

EQUONI: "Eluama, I have a third eyelid which covers my eyes when I go under water, so I can see. My ears and nostrils close up, so I am doing very well when I am hunting fish. Speaking of fish, all this talk is making me hungry. I am going to use my underwater skills to hunt for some nice juicy fish. I will see you next time, Eluama."

ELUAMA: "It was so great to see you, Equoni. Your name stands for "river" in the Cherokee language. So go enjoy the river and what is in it. See you soon!"

ELUAMA is happy, but tired. It has been an eventful day. She goes to the bottom of the river , snacks on a rainbow, covers herself in a blanket of bubbles and retires for the night.



Complete the SIMULATION ACTIVITY FOR HABITAT (entire class)

See Handout in **RESOURCES** section.

This simulation activity illustrates how habitat, and the balance of nature is impacted through pollution and how it can be a chain reaction impacting others as well. See the handouts for materials, the set-up of the activity, and rules. You will need the gym or an outside area for this activity so the class can spread out.

Resource: Kentucky's Threatened and Endangered Species, Kentucky Department of Fish and Wildlife Resources

As of 2001 this publication lists the following species listed below as threatened or endangered:

Reasons for the endangered status of mussels: Reservoir construction impacts mussel habitat in different ways. The properties of the water changes above and below the reservoir. Siltation, channelization, and water pollution are all reasons that impact the mussel habitat.

Reasons for the endangered status of the other wildlife: Human disturbance in the habitats, pollution and siltation of streams, pollution through use of pesticides, general loss of habitat.

ENDANGERED Species in Kentucky:

MAMMALS – 3

BIRDS-4

REPTILES-1

FISH-5

INSECTS-1

CRUSTACEANS: 1

MUSSELS: 14

PLANTS: 9

End Student Text

Specific Species

Virginia Big-eared Bat
Gray Bat
Indiana Bat
Red-cockaded Woodpecker
Interior Least Tern
Relict Darter
Duskytail Darter
Paleozone Shiner
Pallid Sturgeon
American Burying Beetle
Kentucky Cave Shrimp
Cumberland Elktoe (mussel)
Fanshell (mussel)
Cumberland Combshell (mussel)
Oyster Mussel
Catspaw mussel
Northern Riffleshell (mussel)
Ring Pink (mussel)-Little wing Pearlymussel
Orange-Foot Pimpleback
Clubshell (mussel)
Rough Pigtoe (mussel)
Fat Pocketbook (mussel)
Cumberland Bean (mussel)
Copperbelly Water Snake
Braun's Rock Cress (plant)
Cumberland Rosemary (plant)
Cumberland Sandwort (plant)
White-haired Goldenrod (plant)
Short's Goldenrod (plant)
Running Buffalo Clover (plant)
Newly added to the list are monarch butterflies!



- **Student Text (print or send to student Chromebook/devices)**
- **HANDOUT: Simulation activity for habitat.** This simulation activity illustrates how habitats and the balance of nature in general, is impacted by pollution. The activity shows how a disturbance can cause a chain reaction not only in one habitat, but can impact others, and can have an impact on the entire natural balance. See the handout for materials, and set-up of the activity and rules. **RESOURCES.**
- **WATER TESTING:** Conduct testing on water from different sources around your school and from home. Inexpensive water testing kits can be found on line and in department stores. The Kentucky River Authority, the Kentucky Riverkeeper, and the Kentucky River Watershed Watch are resources for educating students about water testing and operation of the lock and dams. They may have a staff person or volunteer that could come to your class.
- **WRITING/RESEARCH:** Add to the mythical, magical, Eluama story in this chapter. The story in this chapter introduces some animals that can be found in the Kentucky River watershed. Refer to Chapter 2 and **research** and describe the **habitats** of the animals featured in the story. Use standard field guides and or “Kentucky Fish and Wildlife- Wildlife Diversity”, [https:// fw.ky.gov/wildlife diversity](https://fw.ky.gov/wildlife-diversity) –google: Wildlife diversity + Kentucky Department of Fish and Wildlife. The publications have information on animals/plants are that endangered and threatened in Kentucky. Reasons are given and planned actions on what to do about it. Select three (3) species from the list of endangered species. Learn about the species and why they are endangered. In your mystical/fantasy story pretend to be at the river. Tell Eluama about these species. Include in your writing stewardship activities that could help bring the species back from the endangered status. Add your story to your journal!
- **(Embedded in Text) WRITING/RESEARCH Descriptive Notes and Illustrations:** Research, illustrate and describe (at least 3 fauna) a fish, animals, insects, butterflies, bees, clams, snails, bats, reptiles and or birds. Identify some plants that can be found in their Kentucky River watershed habitat. Research the preservation status. Students can use standard field guides for the above creatures and plants in the region and the “Kentucky Fish and Wildlife- Wildlife Diversity” ([https:// fw.ky.gov/wildlife diversity](https://fw.ky.gov/wildlife-diversity)). Make a google query: Wild-life diversity + Kentucky Department of Fish and Wildlife. The KFW publication has information on animals that are endangered and threatened in Kentucky including some of the reasons why they have that status. Some mitigation or corrective plans for actions are completed or in progress. See: Kentucky Monarch Conservation Plan posted on the Kentucky Department of Fish and Wildlife website: <https://fw/ky.gov>. Google search: Kentucky Monarch Conservation Plan. Add your research to your journal.
- **HANDOUT: Puzzle:** Students complete the puzzle of the Kentucky River Water Trail, created by Pat Banks, Kentucky watercolor artist and the Kentucky Riverkeeper. Add to your journal.
- **HANDOUT/PROJECT: “How to make a butterfly garden”.** Students will see a list of plants that attract butterflies. Along with this **re-search** the Kentucky State Preservation Plan for the Monarch Butterfly (see website above). Add to your journal.
- **HANDOUT– Draw a maple , tulip poplar and elm leaf .** Pay attention to the pattern of the veins and contour of the leaves. Add to your journal. See RESOURCES
- **READING/WRITING handout: Wendell Berry** Students read and interpret the quote from **Wendell Berry**, a famous Kentucky writer, who has a farm beside the Kentucky River. How does this connect to the endangered species list? Write a short paragraph with an explanation/interpretation, in your own words.
- **HANDOUTS: Rules and examples for poems: Haiku, Sensory Poem, Acrostic Poem** - Use the vocabulary list and list of endangered species as a resource for writing a poem. Write it or copy it for your journal. See Handout with poem genres and sample in the RE-SOURCES section.
- **WRITING/DRAWING: Backyard Habitat Map** - describe, label, and illustrate your back yard! Do you have grass, rocks (what is under the rock?) trees, forest, field, creek, cave? Draw it! Do you have animals that visit, squirrels, birds, raccoons, opossums, snakes, or lizards?Add to your journal.
- **FIELD TRIP:** Ask your family to take a field trip to the Salato Wildlife Center, Frankfort KY- the center has several different habitats/ exhibits with animals, fish, plants etc. Students can report their experiences to the class or write a paragraph in their journal. Ask your parents or grandparents to take you for a walk in the woods or field. Can you identify any plants, trees, flowers, animals? Explore your world!
- **HANDOUT:** Recipe: Mint Tea or Mint Tea Slushie.
- **HANDOUT:** Recipe: Edible Flowers and Greens. *Always have a field guide and an experienced adult!*



SOURCES:

The National Audubon Society Field Guides are an excellent source of reference photos and descriptions of wildlife, insects, reptiles, trees, flowers and more.

Publication: Kentucky's Threatened and Endangered Species, Kentucky Department of Fish and Wildlife Resources. (see the Kentucky Department of Fish and Wildlife's website)

<https://www.epa.gov/endangered-species/learn-more-about-threatened-and-endangered-species>

www.Sun-sentinel.com

History.com

Smithsonianmag.com

<https://greenplanetforkids.com>

<https://sciencing.com/effects-sewage-aquatic-ecosystems>

www.MarineBio.org

www.Ducksters.com

Kids.Nationalgeographic.com

Appalachian Voices, www.appalachianvoices.org

Resource: Kentucky's Threatened and Endangered Species, Kentucky Department of Fish and Wildlife

www.exploringnature.org

www.nps.gov

<http://www.epa.gov/>

<https://entomology.ca.uky.edu>

<http://kentuckyriverkeeper.org>



5 The First People

Pat Banks and Roberta Hounshell



Grade: 3-8, Time: 1- 2 periods (or longer depending on what activities the teacher chooses)

Unit Objective:

Discover Native Americans through History, Science, Art, Culture, Conservation, and Education while Cultivating Stewardship and Responsibility for our Environment

Introduction

This story of the natives of the watershed began over 12000 years ago and is still being written today.

Judy Sizemore, a noted Kentucky writer quotes Dr. Thomas D. Clark, noted Kentucky historian, in her collection of interviews: Strong Voices: Native American Women of Kentucky. In his 1992 Kentucky Encyclopedia, he makes the brief reference to native people; "None actually occupied with any permanence the present geographic pale of Kentucky, although Indians from both north to south visited the region on hunting and warring expeditions." Judy Sizemore writes: Archaeologists have long since disproved the myth of the so called "Dark and Bloody ground" inhabited only by roving bands of hunters and warriors and replaced the myth with facts about the continuous inhabitation of Kentucky.

In the book, Braiding Sweetgrass , Robin Wall Kimmerer states that "In the western tradition there is a recognized hierarchy of beings, with, of course, the human being on top – the pinnacle of evolution, the darling of creation - and the plants at the bottom. But in native ways of knowing, human people are often referred to as "the younger brothers of creation." She explains that hu-mans are the youngest and least experienced of all of creation and that we can learn form the plants and animals that have come before us. "Their wisdom is apparent in the way they live. They teach us by example."



Lesson Objective:

Students will be able to describe the importance of water and other natural resources in Native American culture.

Students will be able to describe how Native Americans farmed and explain the idea behind companion planting ("The Three Sisters" story)

Students will be able to describe or imagine the life of a Native American child.

Students will be able to list and discuss stewardship activities.

Materials:

- Student Journals, see **RESOURCES**.
- Illustration of the Elements and the principals of design, Make your Posters POP! **RESOURCES**
- HANDOUT - Print out the student text or send to student Chromebooks.
- Chart paper for brainstorm activity or use technology.
- Print materials needed for the chosen activities from the **RESOURCES** section (or send to student devices).
- Print out the “Native American Stories” (or send them to student devices). See **RESOURCES**.
- HANDOUT – Masks of the Seven Clans. See **RE-SOURCES**.
- HANDOUT- Print out the Cherokee alphabet and the words written in Cherokee. See **RESOURCES**,
- HANDOUT- Print out examples of suggested forms of poetry or students select their own choice of poetry using vocabulary from the chapter. See **RESOURCES**.
- Print out the Native American legend “The Three Sisters” (or send to student devices). See **RESOURCES**.
- Highlighters to highlight information/ vocabulary. See **RESOURCES**.



Native people let nothing go to waste from the bison. The bison provided meat for food, hides for clothing, blankets, bedding and shelter. The horns and bone were used as tools and utensils. The bladder was used to make waterproof storage containers or carrying water.



Thought on The First People by Mary Hufford, PhD

One of the most amazing things about the standing river of trees at our headwaters is the abundance and variety of nuts they produce. How many kinds of nuts can you recognize and name? Why are there so many different varieties? Part of the answer lies in their success at collaborating with animals. It took millions of years for these partnerships to develop. Nut trees evolved in relationship with birds (corvids) and squirrels (sciurids), whose mouth parts evolved in relationship with nuts!! The larger mouths of squirrels have for thousands of years helped walnut, butternut, hickory, and oak trees to plant their seeds at the edges of forests, where the sunlight can help them sprout. But while squirrels can only plant one nut at a time, chipmunks can stuff their cheeks with beech nuts. The strong beaks and jaws of blue jays are good for carrying acorns where they need to be. Many animals, from tiny mice to massive bears depend on nuts for food. Have you ever heard the sound of a distant bear crunching down on pignuts in the fall? Or squirrels breaking into shagbark hickory nuts high in the canopy? Nuts are valued as well by humans. Have you ever seen black walnuts curing on the roof of a shed? Many older people remember going nutting with their grandmothers as children. Have you ever done that? Have you ever eaten black walnut pumpkin bread? Or hogs that have been raised on acorns and red mulberries? Or eaten groundhog seasoned with spicebush berries, also known as "Appalachian allspice?" Ask an old-timer what their favorite nut is, and they may tell you "shagbark hickory." When you stop to think about it, the forest at the headwaters of the Kentucky River is what remains of an ancient food forest tended for thousands of years by Native Americans. You might know of people who preserve nut trees on their land, not because they plan to harvest the timber, but because nut trees are good for the animals. Native Americans tended forests, meadows, and gardens together within larger systems called "savannahs." Savannahs provided materials for shelter along with plants and game on which humans relied for food and medicine. Native Americans developed techniques for cultivating foods and materials that were of the greatest value to them. They developed methods of hunting and fishing that are used by settlers. Have you ever seen a "wingbone turkey call?" Or sweetened your pancakes with maple syrup? Or heard a mountain feist treeing a squirrel? Did you know that mountain feists were first bred by Mississippian people? These are some of the gifts our ancestors gained from encounters with Native Americans. And we are still learning about the impact of Native Americans on the trees of the standing river. Archeologists discovered that about 7500 years ago, there was a sudden change in Native American diets recorded in archeological sites. Whereas previously there were not many nut shells at these sites, there was a tremendous increase. How was that possible, and what did it mean? Nuts are not easy to harvest from the ground, because squirrels gather up the best ones before they fall, including shagbark hickory nuts. At about that time, Native Americans began relying on nut milk, produced by boiling hickory nuts. The word "hickory" comes from an Algonquian word, Pawhiccoria, meaning "nutmilk." How were they able to gather enough hickory nuts to produce an abundance of nut milk? Through a practice called "Hickory silviculture" – the cultivation of hickory trees – Native Americans isolated hickory trees from all other trees so that squirrels could not reach the hickory canopy by jumping there. Partnering with hickories allowed nomadic Native American communities to settle down and develop towns. Is the deliciousness of shagbark hickory nuts a result of Native American horticulture? Can you think of all the ways in which we partner with trees? How does our partnership benefit the trees and the creatures they serve?

Lesson Procedure

Pre assessment:

A. Activate prior knowledge: In chapter 1, “**The History of the Kentucky River**” students learned how, over the span of 4.5 billion years, several naturally occurring events extinguished all life on earth. Each time, earth regenerated, and life returned. During the most recent times (roughly the last few hundred years) the natural world has become unbalanced. We have seen many animals and plants become extinct or endangered, due to the loss and shrinking of habitats. We have seen the degradation of our air, water, and land. Early Native peoples, living in the Kentucky River watershed, respected the gifts that nature provided, and accepted the responsibilities, that have ,to take care of and live with nature. It was a reciprocal and sustainable relationship. We need to examine our modern relationship to nature and learn to live /thrive with the natural world in a respectful and sustainable way.

B. Brainstorm: The class can be involved in a brainstorm activity about their pre-knowledge regarding Native peoples in Kentucky:

- How did Native Americans dress?
- When you think of Native Americans, what comes to mind?
- What tribes lived in Kentucky?
- How far back does Native American history go?
- What type of dwellings did they live in?
- What was the life of a Native American child like?
- How did Native Americans travel?
- How did Native Americans farm?
- How did the Native American treat their natural resources?

NOTE TO TEACHER: Keep the answers students gave during the brainstorm session so they can be compared with the changes in their understanding as an outcome of the lesson.

C. Students read the text to themselves, out loud taking turns. OR the teacher reads the text out loud while students follow along. Students will highlight the given vocabulary in the text as they read.

After having read the section that describes the life of a Native American Child, do the **VISUALIZATION** exercise: the teacher can ask students to close their eyes and visualize what they “see” as the teacher reads the story:

D. After reading the text, the teacher will ask comprehension questions given below.

Choose at least one as an entry into student’s journals. Teachers can use discretion as to how many questions they want students to answer in the student journals. Teachers can decide what level of support is needed (i.e., notes on the board). Note: the use of cooperative learning strategies is highly recommended when working with this content to deepen understanding . Some cooperative learning strategies can be found in **RESOURCES**.

- How did Native people feel about the resource of water? What did you learn about their philosophy about natural resources in general?
- Students can research independently or discuss together how the native children live today. Hint, many of us have native heritage or connections. They/we are part of our modern world. Contrast and compare today with the past.
- How did Native Americans farm? Explain the idea behind the “Three Sisters” practice of companion planting.
- What were the important milestones in the history of Native peoples in Kentucky? Present the information in text or in the form of a timeline.
- Describe/compare the differences in how the first people and settlers related to nature and the natural world.
- How does the philosopher, Vine Deloria, describe the difference in understanding of natural resources between Native peoples and the European settlers?

Post-lesson-assessment

A. Have students make an entry in their journals about one or all the comprehension questions above. Teachers can use discretion with how many and which questions they answer.

B. Stewardship activity: have students document, in their journals, the overall philosophy of the native peoples. The first peoples respected nature and practiced gratefulness for the gifts from the natural world . They practiced sustainability by taking no more than they or their tribe needed and they let nothing go to waste. They were aware of nature’s need to regenerate.

C. Assign one of the activities listed below (below the student text) to the entire class OR assign different activities to cooperative learning groups to be shared with the class after completion. Students add evidence of their activity in their journals.

See student text below. NOTE TO TEACHER: *The following text is attached as a word document to be printed out and given to the students or sent to student devices.*



Students can add sketches from the natural world to their journals. See **RESOURCES**.

STUDENT TEXT

The First People in Kentucky

Vocabulary:

Chronological Timeline: A timeline starting with the earliest event and following the order in which the other events occurred.

Companion Planting: The close planting of different plants that enhance each other's growth or protect each other from pests.

Allelopathic Substance: A substance that has a negative or positive effect on one type of plant from a chemical produced by another plant. For example, substances from a plant might reduce the weeds around nearby plants when washed off in the rain. Another example is, the prickly hairs on the rosey squash vine keep animals away that might eat the plant and nearby plants. In this type of companion planting, the sum of the elements creates a nearly perfect ecosystem, especially when the sun and rain work in the system as they should.

Environment: The surroundings or conditions in which a person, animal, or plant lives and operates.

Natural Resource: A source, supply or support given by nature.

Philosophy: Is a study people undertake when they seek to understand fundamental truths about themselves, the world they live in, and their relationship to the world and each other.

A Brief History of the First People in Kentucky

It is understood that Native American history goes back over eleven thousand (11000) years in Kentucky. It must be noted, however, that much of that rich cultural history happened before recorded history and most of what we know, (or think we know,) about Native American history is recorded and stored within the Commonwealth of Kentucky's archaeological records. Documented are the remains of thousands of camps, villages, town sites, caves, rock shelters, leftover monuments, and earthen and stone mounds. Some are still waiting to be found. The history of Native Americans has not been clearly documented because their culture and history were handed down in oral traditions. Some stories remain and their artifacts help tell their story. We have much to discover. Initially, it was thought, by the settlers, that Native Americans never lived (and only hunted) in Kentucky. However, across the state, thousands of chipped stones, rock art, cave paintings, arrowheads, and ground-stone axes have been found that provide archeological evidence that Native Americans lived here for thousands of years. While many tribes lived in Kentucky, the most prominent early indigenous tribes were the Cherokee, Chickasaw, and Shawnee.

November is Native American
Heritage Month

and

November 28th is Native American Day!



Let's look at the chronological order in which historical events happened:

Prior to 8,000 BC - Paleoindians initially lived in Western Kentucky and then migrated and settled in central and eastern Kentucky. They used tools and were hunters and gatherers. Groups of 15 -20 people hunted mammoths and mastodons. There is archeological evidence that they stayed close to Kentucky rivers for water, freshwater fish, and shells.

From 8000 BC to 1000 BC - Native peoples continued to live in Kentucky. As the Ice age ended during this period, around 7000 BC, the climate became milder overall. There was more rain and less snow with long dry spells in between. Plants, animals, and humans had to adapt to these climate changes. The people still hunted and gathered and did not live in permanent settlements. Around 6,000 BC, native hunters started to use the atlatl (spear thrower) to hunt deer, elk, bear. They trapped and snared animals such as racoons, squirrels, groundhogs, and rabbits. Nuts, wild fruits, and plants were harvested throughout the growing season. Some were dried to preserve for winter. They also used nets and fishhooks to catch freshwater fish and mussels.

1,000 BCE to 200 CE was called the Woodland period - The climate of Kentucky, during this time, was similar to the climate in Kentucky today. Native people were still hunters and gatherers and moved with the seasons. The milder climate enabled them to stay longer at their settlements, and they also tended to return to their settlements after long hunting trips. When gardening, they used controlled burns to kill weeds and enrich the soil. They cultivated the earliest sunflower and goosefoot. During the Woodland period a special culture emerged, named the Adena Culture. People of this era lived in groups of 15-20 people with members of their extended family. There is archeological evidence that they traded both locally and with other tribes far away. Garden plants became increasingly important to their diet. This culture distinguished themselves as they used Kentucky limestone to make pottery! Traditionally, storage and cooking containers were often crafted out of gourds, wood, shells, skins, leathers, baskets, and other natural elements. The Adena people, however, started to use clay to craft and develop painted and decorated ceramics (pottery). This began to transform how food was stored and prepared. Ceramics were also incorporated into masks and other ceremonial uses.

While changes and advancements took place in this era, other aspects stayed the same. Lives remained firmly rooted in family and in honoring cultural traditions. Native Americans hunted the same animals, collected the same kinds of wild plants, and maintained their relationship with natural resources.

900 CE to 1750 CE was called the Fort Ancient culture - Many Native people, of this era, were no longer true hunters and gatherers. They lived in permanent settlements and relied on their gardens. Native Americans used fire and tools to clear tracts of land. They used controlled burns and crop rotation in gardening. They used fire to cultivate plants, control weeds, enrich the soil, cook food, make medicine, and make baskets.



Look up several different animal tracks from animals in the Kentucky River Watershed. Draw the tracks in your journal and label them. A good place to look for foot print samples are field guides.

Gardening Practices Developed by the Fort Ancient People

Native people practiced companion-planting in their gardens. One of the main examples was the three crops, corn, beans, and squash or pumpkin (called: selu, tuya.iya in the Cherokee language). The combination of these plants helped rejuvenate the nitrogen in the soil, keep insect infestation down, and maintain moisture in the soil. (See the "The Legend of the Three Sisters, see RESOURCES). While each plant produced food, their technique involved planting these crops in a way in which the plants worked together. Native farmers planted the three seeds together in mounds, not rows. The cornstalks formed the center pole, giving the beans a means to climb towards the sun. The weblike bean roots returned nitrogen to the soil. Broad squash leaves shaded the ground, slowing evaporation, and the plant itself produced an allelopathic substance (a substance that has a positive effect on one type of plant by a chemical produced by another plant). This substance reduced the weeds when it washed off into the soil by the rain. Meanwhile, the prickly hairs on the rosey squash vines kept animals away that might have eaten the plant. In this type of companion planting, the sum of the elements creates a nearly perfect ecosystem. Hunting animals and gathering wild produce only occurred as needed to supplement and enhance their diet. Some Native Americans remained hunter gatherers, such as tribes in the Great Plains regions.

Native Americans developed and practiced stewardship in gardening, hunting, fishing, and in their harmonious relationship to nature. They used this knowledge of the earth and these relationships long before the arrival of the First Settlers. This knowledge remains relevant and valuable today. The earth itself was held sacred throughout Native American history. Today ceremonies continue to be held related to the earth and the environment, and tribal governments address environmental issues that affect their communities. Native people, and others with cultures that value balance in nature, strive to respect and preserve nature. They have traditionally obtained food, clothing, tools, transportation, homes, and medicines from the environment they lived in while not depleting the ability for regeneration. Native people's beliefs are tied philosophically and spiritually to their environment, and they practice respect and gratefulness.

There is evidence that during the Fort Ancient Period, sometime around the 1680's, the first interaction with European hunters and settlers occurred. Native Americans traded animal skins and crafted items for iron tools, kettles, and other exotic wares from the Europeans. But there were unforeseen consequences. Smallpox and other European diseases began to spread to the natives. They had no natural immunity to these new diseases. It is estimated that these diseases killed over 75% of the native people in the region. This was devastating to their history and culture. It is hard to imagine the many stories, traditions, families, villages, and histories that were lost.



Do you see the beans and squash growing on the corn?
Raccoons love gardens too!

Take the time to sketch beans, corn and squash in your journal!

You can easily find these vegetables at a local grocery, farmers market (in season), and in your own garden.

Comparisons of Native People and European Settlers Land and Resource Use

The late Native American scholar and philosopher Vine Deloria Jr. described the difference between European and Native American understandings of the universe in an interview published in the article "Where the Buffalo Go", by Derrick Jensen, published in Sun Magazine, July 2000:

"I think the primary difference is that Indians experience and relate to a living universe, whereas Western European people, especially scientists, reduce all things, living or not, to objects. The implications of this are immense. If you see the world around you as a collection of objects for you to manipulate and exploit, you will inevitably destroy the world while attempting to control it. Not only that, but by perceiving the world as lifeless, you rob yourself of the richness, beauty, and wisdom to be found by participating in its larger design."

The Europeans settlers viewed the way Native Americans used the land as chaotic and wild. The settlers viewed gardening differently. They believed that order needed to be established and nature needed to be tamed. Once settlements were established, settlers began to clear-cut forests and overhunt game to sell, such as beaver and bison, to the point of near extinction. This was a clash of cultures and civilizations. The Americas had been home to people who had been conserving, cultivating, and managing the land for thousands of years. Previously native women had processed skins and made clothing, bedding, and other necessities for their families and for trade. According to Judy Sizemore in "**Strong Voices: Native American Women of Kentucky**," women generally owned the homes and could divorce a husband and retain their homes. They (Women) made the decisions about childbearing and controlled the usage of land." Women's councils also played important roles in the tribe's decision making process, "...often selecting the council members and making decisions on issues like war and peace." This land was now being settled, mined, farmed, and ancient trees harvested, in the name of progress and civilization. The settlers were leaving Europe for a new life. Some were seeking religious, economic, and cultural freedom in this "new" world. Think how brave these immigrants were to travel over the vast oceans and come to a whole new continent, a place where they knew no one. These settlers were following dreams and hopes of a new life. A life that would allow them, and their families, to own their own farms, build new businesses, and build a new life that seemed to have unlimited possibilities. This dream and use of the land was different than the native peoples.

Importance of Water in Native People's Culture

Water meant many things to Native people, in the past and today, including cleanliness, strength, change, healing, dreaming and unconditional love. The water represented life and death! Depending on the condition of the water and its clearness, water could represent both good and bad health. First Nations people today recognize the sacredness of our water as the basis that supports all life. For that reason, water must be protected from pollution, drought, and waste. Without water all life will perish. Many early Native American settlements were along waterways as water provided an easy means of transportation, supply of food, water and ceremonial practices.

In her article, "Cherokee Stories tell of Water's Wisdom", Susan Stafford Kelly writes that the river knows best as it nourishes, guides, warns and welcomes. Cherokee river rituals and lore protect the mind, body, and spirit. Ms. Stafford shared that a traditional Cherokee practice involved praying at the river and submerging themselves. Submerging in the water was ceremonial and thought to wash away illnesses and bad thoughts. Cherokee men would bathe before returning to their communities from war. They bathed at the new moon, besides their daily bathing ritual. This was held so sacred that it was a taboo to spit into the water or contaminate it with anything, including animal blood. These practices helped keep the water clean for drinking. Historically, the Cherokee did not suffer from diseases such as typhoid and dysentery which are connected to poor water sanitation.

Cherokee storytellers like Freeman Owle tell many stories that originated from the knowledge about the river, and nearly every story has a river in it. Those stories reinforced certain cultural codes of conduct. In referring to waters, the Cherokee talk about rivers and the entire watershed. Dr. Barbara Duncan, education director of the Museum of the Cherokee Indian, shared that Cherokee cannot be separated from their rivers as it was once the source of food, medicine, sport, celebration, cleansing, trade, and navigation. The wellbeing of the tribe was dependent on the river. Their towns were situated by rivers on the west side, as their water ritual (bathing/submerging) faced east. River names were descriptions of the river, like Ocanoluftee: "going really fast" or Antokiasdiya: "the place where they race" (canoes). The stories are and were told simply and served as warning or explanations for the inexplicable. Children listened and learned that the river can be dangerous, and its power must be respected. They learned that the river sustains all life and it must be clean.

For another Cherokee storyteller, Jerry Wolfe, the importance of rivers is connected to the Cherokee sport of stickball, which is a rehearsal for battle. He tells how the players were taken to the river seven times over the course of the day to build power. Players would then dip their sticks into the river (always upriver) and take a sip of water from the drippings. That built a connection to the river and provided strength for the players/warriors. The river stories go back thousands of years and they have been told and retold. The stories live in the oral traditions of Cherokee storytellers and in the land itself.



The Legend of the Three Sisters

There are several legends surrounding the Three Sisters. Almost every Native nation seems to have its own. This is the version of the legend of the Haudenosaunee (Iroquois). The three sisters represent corn, beans, and squash. These vegetables planted together influence and enrich each other's growing environment and development. This story, as with other native stories, were meant to teach, inform, and guide the people about their history, cultural morals, and values.

Very long ago, there were three sisters who lived in a field. The youngest was so small she could not yet walk; she crawled around the ground, dressed in green. (squash) The middle sister wore a bright yellow dress (bean) and darted back and forth across the field. The eldest sister (corn) stood tall and straight, and her body bent with the wind. She had long yellow hair and wore a green shawl. The three sisters loved one another very much and could not imagine living without the others.

One day a little Indian boy came to the field. He was very handsome and knew the ways of the land. He could talk with the birds and the animals and was straight and fearless. The three sisters were very interested in this boy as they watched him use his stone knife to carve a bowl or hunt with his bow and arrow.

Late in the summer of the boy's first visit to the field, the youngest of the three sisters disappeared. She was the one who could only creep along the ground; she could not even stand unless there was a stick she could cling to. But she was gone, and the other two sisters mourned her until the fall.

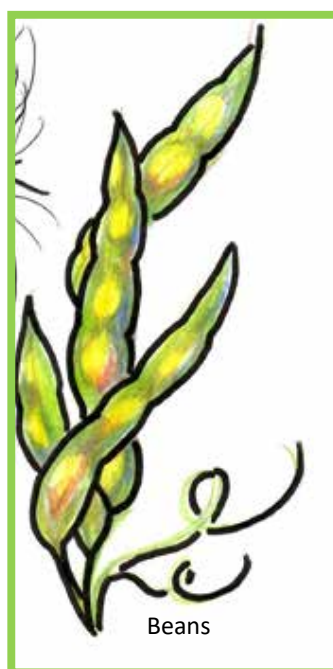
The Indian boy returned to the field to gather reeds that grew at the edge of a small stream. He cut the reeds to make arrow shafts. The two remaining sisters again watched him, fascinated. That night, the second sister disappeared, the one who always wandered hither and yon.

Now there was only one sister left, the tall and straight sister. She did not bow her head in sorrow, though she mourned deeply and thought she could not live in the field alone without her sisters. As the days grew shorter and colder, her green shawl began to lose its color and her yellow hair became dry and tangled. Night and day she sighed for her sisters, but her voice was low like the wind, and no one heard her.

One day in the harvest season, the little Indian boy heard the third sister crying, and he felt sorry for her. He took her in his arms and carried her to his home, and there a delightful surprise awaited her. Her sisters were there in the lodge, safe and very glad to be reunited. They explained that they had been curious about the little Indian boy and had followed him home, and they had decided to stay because winter was coming, and his home was warm and comfortable.

The sisters also were making themselves useful to the boy and his family. The youngest, now all grown up, kept the dinner pot full, while the second sister, still in her yellow dress, dried herself on the shelf so she could fill the dinner pot later in the winter. The eldest sister was so pleased to be with the sisters again and so impressed with the help they gave the boy, that she too began drying herself so the family would have meals to use as the winter went on.

And from that day to this, the three sisters were never separated again.





Indigenous and Pioneer Women in the Kentucky River Watershed

Judy Sizemore

The well-being of families in both pioneer and indigenous families in Kentucky's early historic period depended largely on the skills of women. In their gardens, women raised not only most of the food that their families ate but also medicinal herbs to tend to sicknesses, injuries, and childbirth. They harvested the crops and dried them to preserve them for use during the winter months. They gathered and preserved berries, nuts, and wild plants to add to their family's diet. They also helped to butcher and preserve meat and did most of the cooking.

Women who were particularly skilled in herbllore were known as herbalists and often shared their skills with neighbors. Some women, known as midwives, specialized in helping women during childbirth.

Women also needed a variety of skills to provide clothing for their families. Ready made cloth was not available to them, so they had to make their own cloth before they could make clothing. They made some clothing from animal skins like deer or rabbit. First, they had to carefully scrape the skins to remove any fat or meat. Sometimes the hair or fur was left in place but sometimes it was removed. There were several techniques used for removing hair or fur. Dry scraping was one technique, but other times women would soak the skins in a mixture of wood ash and water. Sometimes they placed the skins in a fast-running stream. Then they made a paste by cooking the animal's brains in a small amount of water and rubbed the paste into the skin. After rinsing out the paste, they stretched and worked the skin to make it soft and pliable enough to sew into clothing.

Native women also made cloth from plant fibers. It was a long process! They couldn't go to the store to buy yarn. They had to make the yarn themselves. Native women used wild plants like rattlesnake master or milkweed. After removing the stems and hard parts, they pounded the fibers to softenthemt. Then they rolled the fibers between their hands or along their thighs to straighten it before twisting it into yarn. They used wooden frames to weave shawls and blankets. They used their finest yarns to weave shawls that were soft and beautiful. They also used plant fibers to make slippers, baskets, bags, nets, and mats. It was hard work, but women enjoyed adding artistic touches like designs and patterns.

Pioneer women used plant fibers from flax they grew in their gardens or woolen fibers that came from shearing their sheep. Processing the flax and the raw wool was time consuming, but pioneer women did have tools that helped them spin the wool (spinning wheels) and weave it into cloth (looms). Still, spinning and weaving were slow processes. It was only after all this work that pioneer women could begin sewing clothing. No wonder they saved every scrap of cloth! After a garment became too worn or too small for the youngest child, women cut the cloth into pieces and recycled it into quilts. Like Native women, pioneer women took pride in creating items that were artistic as well as practical.

For all these activities, women depended on clean and abundant water. The Kentucky River and the streams and rivers of its watershed were vital to both Native people and pioneers who settled in the region.

LIFE OF NATIVE CHILDREN BEFORE THE EUROPEANS SETTLERS

The average size of a European family at the time was around six or seven children, while the typical Native family had three to four children. The arrival of a child was celebrated with ceremonies. Mothers would usually carry on with daily work while carrying the baby on her back in a cradleboard, sometimes until they were two or three years old. Giving children names was also an important task. A birthname was not commonly used, rather people referred to each other by their relationship, i.e., Mother, son, nicknames were common, and boys were often named after a characteristic or accomplishment they had. The transition from child to adult was marked by the completion of a rite of passage. Once that rite was completed, they were considered an adult.

Susan Mullins, Mohawk of the Iroquois Nation, shared that children in those times did not go to school. The female children followed their mothers and grandmothers around and learned by observing them. The children played games that centered around learning essential skills like cooking, basketmaking, and working in the fields.

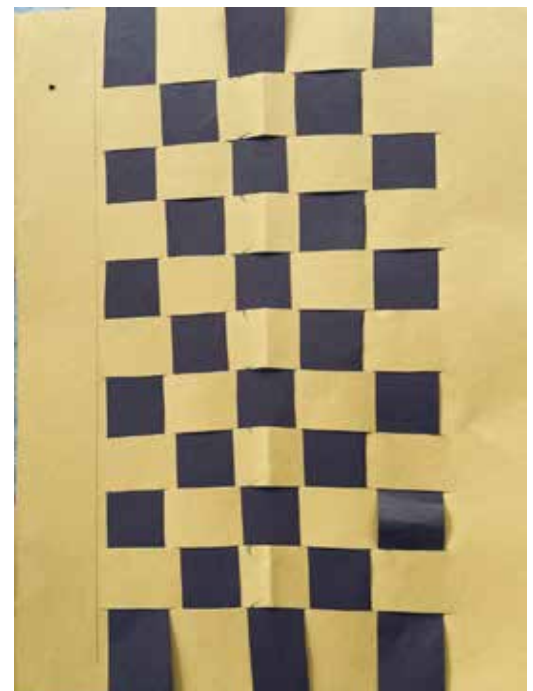
Boys, on the other hand, followed the men around (fathers, grandfathers, etc.) and learned essential skills from them, like hunting, tool making, and fishing. This often included being tough and strong as very young children and not showing emotion. They were also expected to learn and follow the traditions and morals of their tribe.

In many tribes, babies were traditionally wrapped tightly and snugly in a small blanket and strapped to a specially designed flat board made of a wood plank or woven from basket fibers. This cradleboard could then be carried in the mother's arms, strapped to her back, or set on the ground like a baby chair. Cherokee, for the most part, did not use cradleboards, but preferred shawls.

Cherokee Indians lived in small communities, usually located in fertile river bottoms. The homes had wooden frames covered with woven vines and saplings, held together by mud. They were called wattle and daub houses. Later they were replaced with log structures. Children and their families kept warm when it got cold. Each house had a fire area in the center with a hole in the top of the roof serving as a chimney. Tending to the fires was a prestigious task, left to the elderly, not the children. The open fires often made the dwellings dark and smoky. The houses had raised seats or bed-like structures covered with split cane mats and animal skins which were used to sleep or sit on. Blankets used for covers have always been important in Native Peoples life. These blankets were made from plant fibers, animal hides and furs and later woven from wool and cotton.

In some tribes, when children did not obey, discipline was given in the form of the child being teased and shamed in front of the rest of the tribe. They were also praised and honored for compliant behavior with the entire tribe watching.

While there was a lot of work for the family and tribe to thrive, children also had opportunities to have fun. They often played the same games as adults, like races, tug-of war, and hide and seek. Native People's games generally fall into two categories, games of skill and games of chance (luck). Children also played with handmade toys and dolls made from natural fibers and objects.



TEACHER ACTIVITY TO COMPLETE WITH THE CLASS:

VISUALIZATIONS

Now that we have read about a native child's life let's follow a boy child and/or a girl child along on one of their days. Close your eyes, imagine you are in a Native village, you might smell cooking fires, early morning blossoms from the meadow, or hear the breeze dance in the leaves of the forest.

Imagine a Day in The Life of a Native Girl Child

Pat Banks

Imagine a native girl child going to the river, early on a summer morning, to get fresh water for her mother. On the way, she sees the pink dawn sun shining through the leaves of the trees. She stops and says hello. The grass path that leads through the field of wildflowers is wet with dew. Her feet feel the wet cold dew drops, it makes her smile! She decides to pick some wildflowers on her way home. It will make her mother very happy, and she might use them in a fresh salad. She cannot resist the wild strawberry patch that she passes. She stops and picks the ripe ones and puts them in her pouch, for the family's breakfast. At the beach by the river, she sees some bear, deer, and beaver tracks in the sand. They must have been at the river very early! She dips her water gourd into the river just like her mother taught her, so she can get the cleanest water. A trout jumps out of the cool water and splashes her as he catches his breakfast. As she makes her way back home, the sounds of bird song fill the air with joy. She picks three beautiful flowers from the field, for her mother, and tucks them into her belt. Now she is ready to help with family chores. Today, she and her grandmother will cut some special grasses to weave a new basket, because her brother's puppy chewed a hole in their favorite basket. She helps smoke the fish that her brother and father caught from the river. The smoked fish will help feed the family and village through the coming winter! Her mother lets her have a little taste! Now it's evening, her favorite time of the day. She takes a quick swim to cool off after her day of work. Imagine her eating her favorite dinner of green beans and fresh corn with squash cakes. Her tummy is full and it's time to snuggle into her sleeping furs. She loves falling asleep to the sound of her grandfather's voice while he tells stories around the hearth fire. Was that an owl hooting good night?



Imagine a Day in The Life of a Native Boy Child

Roberta Hounshell

Imagine you are sleeping on your bed wrapped in a wonderfully warm blanket made of fur. You are trying to open your eyes as you hear your father calling you to wake up. The house is a bit smokey because you had a big fire in the fire pit, in your house, last night. Your father urges you to hurry up. The first snow is expected to fall and you need to go into the woods with your dad and uncle to hunt for some food for the cold season. You grab the spear you made with your dad. It is made with an arrowhead at the end. Your father says you need to hurry so you start your way into the forest. Father said that a bear was seen in the woods, so you really do not want to go. You are very afraid. Father said you must learn to be brave and not show your fear, so you rush and join your father and uncle. You quickly reach the forest. Father says you must be quiet and patiently wait to be able to catch something. You must not step on a dry leaf or twig so as not to scare an animal away. You hide under a bush and sit very still. You think about the bear that could be close and your heart beats very fast. A long-time pass and nothing happens. Then you hear a loud rustle, and your hair stands up on your body. You just know it is the BEAR!!! You do not dare open your eyes, but when you finally do, it is just a rabbit hopping by. You sit very still until it comes close. You hold your breath, then you throw your spear. Your aim was good!! You speared the rabbit!! You are very relieved and proud. Just then you hear your father calling for you. He and your uncle hunted a deer, and they need help to get it back to the village. They send a smoke signal, so other men in the village know they must come to help. Your father sees that you hunted the rabbit. He does not say anything but puts his hand on your shoulder. When you get back to the village, your father calls the whole tribe together to let them know how proud he is of you. The others play the drums in your honor and chant about a brave warrior. It feels so good!!!

You were in the woods the whole day. You are very hungry. Your mother and sister made your favorite stew, made of corn, squash, beans, and they added the rabbit you hunted. As you fall asleep you can hear your father tell everybody around the fire of how you were not afraid in the forest and how you were very patient. He tells everyone that you are on your way learning how to be a man. You drift off to sleep, tired and happy with your tummy full.

End Student Text

ACTIVITIES:

- **Student Text (print or send to student Chromebooks/devices)**
- **HANDOUT: Freeman Owle**, Storytelling/Reading a story out loud. The story told by Freeman Owle is included. This handout also has tips on how to read out loud effectively to keep the audience engaged. Students can also use the stories of “The Three Sisters” and “Skywoman” to read out loud or tell the stories. (See separate **HANDOUTS** for the stories). Students can read or tell the stories to their class or all school assembly and mount the posters/drawing in their journals or display in the school.
- **RESEARCH: Cherokee Alphabet**, Students research how the Cherokee alphabet was established. They report their findings in a paragraph and include it in their journals. **HANDOUT: “Cherokee Alphabet”**. Write the characters in the alphabet and the sample words written in Cherokee.
- **HANDOUT: Cherokee Syllabary** – Make a copy of the letters to see how different and clever they are. See the graph page and use for easy copying.
- **HANDOUT: THE 7 CLANS OF THE CHEROKEE**, Draw the seven masks that represent the seven clans on the handout. The masks can have some variation, the native artisans used different materials to make the masks, so there was some creativity and interpretation involved, each mask represented a specific clan. Add this handout to your Journal. As a class or in cooperative learning groups research the 7 clans of the Cherokee. Explain what their purpose and names are. Pick the clan you feel would be best suited for you, and your talents, and design a mask for yourself and other members of your clan.
- **HANDOUT: DRAWING - Squash Beans and Corn**. Students draw squash, beans, and corn to show how they were planted to support each other. Include plants and animals that could be in the field, a butterfly, a bird, a mouse, or any living thing from the habitat. Add to your Journal. See the three sisters legend.
- **WRITING:** Have students write a conversation with the mythical and magical Eluama. They can tell her about their imagined life as a Native American child, or anything else they learned in this chapter. Have the students write in form of a dialogue.
- **WRITING:** Poetry - Students use the **HANDOUTS** featuring the poem forms of Alliteration, Haiku, Sensory Poem, or Acrostic Poem. Students may choose their own form of poetry. Use any of the content and vocabulary as a resource.
- **HANDOUT/ STEREOTYPES:** As a class, brainstorm about what students think they know about the native people. What do they hear and see on TV, books, movies etc. What do they know about headdress, housing, smoke signals, language, etc.? As a class or in groups students compare the information from their brainstorm with the information provided in the **HANDOUT** regarding stereotypes. Have students determine which are factual and which ones are not. Have students discuss how stereotypes might come about. Do they have a purpose? Are they beneficial or harmful. Compare and Contrast opinions and facts.
- **HANDOUT:** Simple Construction Paper Weaving.
- **HANDOUT:** Woven Wall Hanging Using natural materials.
- **HANDOUT:** Legend of the Three Sisters.
- **HANDOUT:** Recipe: Three Sisters Casserole with Cornbread Topping.

Additional Resources:

The Kentucky Arts Council is a great classroom resource. The KAC has a roster of performing artists for character performances, music and visual artists that can help students with their journals, and or other native American dance, crafts, pottery, basket making, and weaving.

The Kentucky Native American Commission sponsors a program, “Annual Living Archaeology Weekend” at Red River Gorge, Gladie Cultural and Environmental Center.

<https://www.oneidaindiannation.com/the-legend-of-the-three-sisters/>

“The Three Sisters-Exploring an Iroquois Garden,” Cornell Cooperative Extension, 1997

<https://www.ourstate.com/supper-with-the-chokecherry-trio-corn-beans-and-squash/>

<http://kyriverkeeper.org>

6 The First Settlers, the Path Through History and Children Living on the Frontier

Pat Banks and Roberta Hounshell



Settler Family
Reenactors at Boonesborough State Park

Bill Ellis, The Kentucky River

“When (Daniel) Boone sighted the (Kentucky) River for the first time, it looked much different than it does today.”

“There could have been no more beautiful sight to Boone and other euromerican pioneers than these plentiful buffalo (bison), at home with their environment and offering an endless source of meat and hides. By the early part of the nineteenth century, the woodland buffalo (bison) had disappeared from the Kentucky River Valley”

TIME: 2 periods (or more depending on chosen ACTIVITIES)

Grade: 3-8*

Introduction

The history of the first settlers in the Kentucky River Watershed is intertwined with the native people, African people and world events. This is a joyful, tragic, and complicated story. We won't be able to do justice to this rich history, but we want to try to make some connections and links for the future scholars we hope to inspire. We have made note of some significant dates, treaties, and events. Some of these are regional in nature but the larger world out-side of this region had significant impacts on the people, settlements, land use, and devel-opment of the Kentucky River Watershed as we now know it!

And with these stories and activities we want the students to engage their imaginations and senses: What do the wild flowers smell like? Can you eat some of them? Draw them in your journal! Can you hear the rustle of leaves in the trees, smell dinner cooking over an open fire, see the morning sunrise, feel the cool water while dipping the bucket into the river for drinking water? Can you feel the textures of grasses and reeds and fabric while making your own quilt or basket? Think about life in the time of settlement, such as walking in the woods, hunting rabbits or mushrooms. What stories or poems are inspired by the journey.

*There are opportunities to expand what is presented in this lesson through student directed independent research. Older students can research historical land contracts. They might, also, research differences in land cultivation practices. Activities can be assigned based on the class or grade level. Writing assignments can be given on different levels. One idea is for a historical reading to be presented to the class in Daniel Boone's own words. We encourage exploring with the senses, writing poetry, sketching /illustration/ observing content, making and tasting recipes, and connecting to this wondrous place, the Kentucky River Watershed.



UNIT OBJECTIVE:

Discover the Kentucky River Watershed through History, Science, Art, Culture, Conservation, Recreation, and Education while cultivating stewardship and responsibility for our environment.

LESSON OBJECTIVES:

- Students will be able to describe what they learned about Daniel Boone and the history of the first settlers.
- Students will be able to give reasons why Fort Boonesboro was built close to the river.
- Students will be able to describe differences in understanding land ownership between Native Americans and Europeans and how these differences led to conflicts.
- Students will be able to describe the life of a child living on the frontier.
- Students will be able to name stewardship activities that help take care of our environment.

Materials:

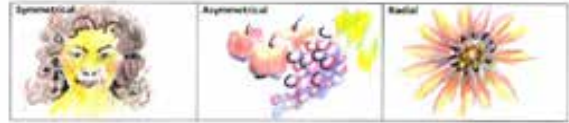
- **Print-out - The First Settlers, the Path Through History and Children Living on the Frontier** or send text to student Chromebooks/devices. See **RESOURCES**.
- Materials needed for the various activities (see **RESOURCES**.)
- Highlighters, if teacher wants to instruct students to highlight information in the text.

Journals: suggestions on how to make and add to your journal.

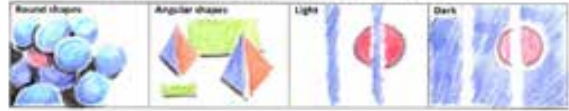


Making posters that pop! Using the principles of Design - balance, Contrast, Emphasis, Movement/ Action, Patterns/Repetition, Rhythm, Proportion, Unity, Variety. These are tools for making your posters pop!

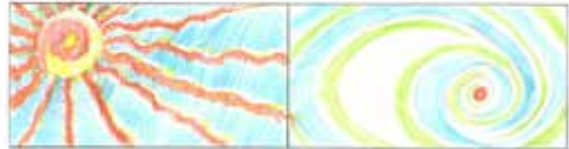
Balance



Contrast-difference between the elements [sharp and round, light and dark, large and small.]



Emphasis- center of interest



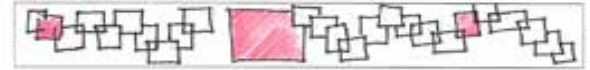
Movement- the look of action, move the eye.



Patterns-Repetition of elements (line, shape, color, texture etc...)



Repetition - elements are used over and over to achieve balance.



Rhythm- movement or beat



Proportion- relationships



Unity

Variety



This simple illustrated vocabulary of the principles of design is a good review for the students and gives them the tools to create posters that pop! It is important to give them the blank worksheets then complete each simple step together! See Resources.

LESSON PROCEDURE:

Print student text (including vocabulary) or send student text to student Chromebooks/ devices.

Pre-lesson-assessment:

- Assess prior knowledge of what students know about this time in history with a class brainstorm activity. Include knowledge of vocabulary. The teacher posts questions such as: Who was Daniel Boone? What do you know about Fort Harrod and Fort Boonesboro? Were there Native tribes in Kentucky when the first settlers came? How did Native tribes and Europeans live together? Describe the life of a child living on the frontier? Did the settlers and Native people have the same ideas about land ownership and farming?
- **Keep the information gathered during the brainstorm activity so that answers from the brainstorm can be discussed as part of the post-lesson-assessment!**
- If vocabulary was not discussed as part of the brainstorm session, go over it before reading the text. Instruct students to highlight vocabulary as it occurs in the text.
- Students take turns reading the text out loud and/or teacher reads text to class.
- Students answer comprehension questions orally and/or in writing in their journals. **The use of cooperative learning strategies is highly encouraged to enhance comprehension!** There are strategies included in the RESOURCE section. **Comprehension Questions:** What did you learn about Daniel Boone and the history of the First Settlers? Why did they build the fort so close to the water? What were the differences in understanding land ownership between Native Americans and the Europeans and the understanding of land usage and farming that led to conflicts? Describe the life of a child living on the frontier. Students can list stewardship activities they can do to take care of their environment. Are there any questions the brainstorming session uncovered that might need to be clarified or added to?
- The teacher determines what questions students answer, in written form, in their journals. The teacher also determines if a question, or questions, are answered as a class activity. Notes can be taken on the board as a support when students write! The teacher determines what level of support students need.
- At this point, the teacher selects which activity, or activities, that students choose from the list below the student texts. One activity could be completed as a class or different activities could be assigned to cooperative learning groups. Groups can share findings with the entire class.
- The activities and HANDOUTS can be incorporated in the student journals.

Post-lesson-assessment:

- Assess the answers to the comprehension question the teacher assigned individually, or that were completed as a group. This can be a journal entry. It is at teacher discretion which and how many questions are to be answered in student journals.
- If any activities were assigned, it is at teacher discretion how they are assessed and documented. Photos of a completed activity could also be part of the assessment (i.e., Crazy Quilt). Teacher assigns an evaluation to an oral presentation (i.e., a reading that depicts Daniel Boone's own words) that might be considered if the presentation was captivating for the audience. Classmates could also be allowed to evaluate the performance!
- At least one stewardship activity is to be included as the assessment for this lesson, since stewardship is a major component of this project.



Examples of art for the covers for the journal or designs for posters or bulletin boards. See RESOURCES

The First Settlers, the Path Through History and Children Living on the Frontier

VOCABULARY:

Indigenous people: originating or naturally occurring in a particular place; native.

Explorer: people discovering new ideas, places, land and people.

Artisan: a worker in a skilled trade, especially one that involves making things by hand.

Native Americans: also known as the First Americans, first people, Indigenous Americans, American Indians, and other terms, are the Indigenous peoples of the United States, and other places limited to the mainland.

Crop: a plant that can be grown and harvested extensively for profit or subsistence. When the plants of the same kind are cultivated at one place on a large scale, it is called a crop.

Frontier: (1) a line or border separating two countries. (2) the extreme limit of settled land beyond which lies wilderness.

Territory: geographical area belonging to or under the rule of a government.

Influence: the capacity to influence the character, development, or behavior of someone or something, or the effect itself.

Hunter: A person or animal that hunts. Deer hunter.

Foreigner: a person born in or coming from a country other than one's own.

Companion planting: the cultivation of different species of plants together in the same area for the purpose of benefiting one or more of them, as planting an insect-repelling plant in a vegetable garden.

Intertribal: existing or occurring between different tribes (intertribal conflict).

Usufruct system: a system in which land ownership is defined as a right to use land but not to possess.

Symmetry: in biology, the repetition of parts in an animal or parts in a plant. Symmetry refers to a correspondence of body parts, in size, shape and relative position, on opposite sides of a dividing line or distributed around a central point. Examples: leaf, sunflower, face.

Texture: how something feels or appears to feel: rough, smooth, bumpy, hard, soft.

River: A river is a natural flowing watercourse. Usually fresh water.

Timeline:

The history of the first settlers in the Kentucky River Watershed is intertwined with the native people and world events. This is a joyful, tragic, and complicated story. We won't be able to do justice to this rich history, but we want to try to make some connections and links for the future scholars we hope to inspire. We have made note of some significant dates, treaties, and events. Some of these are regional in nature but the larger world outside of this region had significant impacts on the people, settlements, land use, and development of the Kentucky River Watershed as we now know it!

1500 - Spanish Explorers traveled throughout the southeast during the mid-1500's. There is evidence of some trade with native tribes. European diseases began to infiltrate villages of Native people. Native people had no immunities to these diseases and countless lives were lost.

1600's - French and British explorers appeared along Kentucky's eastern and western borders.

1688 - Map by French cartographer Jean Baptiste, depicts a trail connecting the Ohio River to Spanish colonies in the southeast. We believe there was some trade between native tribes and the French, English, and Spanish explorers.

1734 - On November 2nd, Daniel Boone was born in Pennsylvania.

1754 -1763 - French and Indian War - This war pitted the colonies of North America and Great Britain against the French. Each side was supported by various native tribes. This helped create conflict between the natives and settlers throughout the region.

1767 - Daniel Boone went a short distance through the Cumberland Gap to hunt.

1769 - 1771 - Daniel Boone and a hunting party hunted and traveled through the region of what is now Kentucky and north central Tennessee.



1769 - Treaty of Stanwix - the Iroquois gave up the land they claimed south of the OHIO River. This action opened Kentucky for settlement.

1772 - Cherokee surrendered their claim to Kentucky to the colony of Virginia.

1773 - Boone led his Family and other families to what was to become Kentucky. They were attacked by Cherokee and turned back. Daniel lost his son and another settler in the battle.

1774 - James Harrod brought his pilgrims down the Ohio River and then the Kentucky River. They landed near, what is now, Shaker landing, in Mercer County. It became the first settlement, Harrodsburg.

1775 - Boone joined the Richard Henderson Company. With 28 companions they built the Wilderness Road. The road was steep, narrow, and rough. It could only be traveled by foot or horse.

1775 - On April 1st Boonesborough, the second European settlement in what is now Kentucky, was built after the settlers crossed the Kentucky River. **According to a display at Fort Boonesborough State Park, African Americans were part of Boonesborough settlement from the beginning. Records refer to these inhabitants as someone's "negro" or "servant" and names were seldom listed. Much work needs to be done to document and tell the African story**

1775 - On April 19th the American Revolutionary War began. The thirteen North American colonies waged war for independence from Great Britain.

1775 - The Treaty of Sycamore Sholes - The Cherokee sold their Land to the Transylvania Land company. Some Cherokee were not pleased with this treaty. They believed the presence of settlers would end their way of life.

1776 - On July 14th three teenage girls (Jemima Boone, daughter of Daniel Boone and two daughters of Colonel Richard Calloway) were captured near Boonesborough, by a small Cherokee and Shawnee party. After three days the rescue party surprised the Indians, wounded several, and negotiated to get the girls home.

1776 - Fewer than 200 settlers remained in Kentucky, mainly in Forts Boonesborough, Harrodsburg, and Logan's Station.

1778 - The French entered the Revolutionary War, on the side of the colonists, thus turning the civil war into an international conflict.

1782 - By the end of the Revolutionary war there were 12,000 settlers and 72 settlements in what is now Kentucky.

1792 - Kentucky became the 15th state in the union.

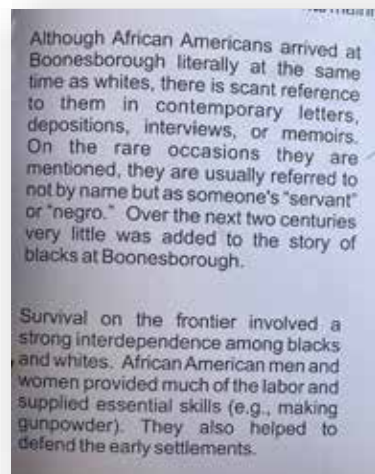
1795 - The treaty of Greenville, officially, ended the conflict between the native people and the settlers. But distrust and resentment continued. The natives did not realize that the treaty would be used as the basis for the "Indian relocation" program.

1804-1806 - The Corps of Discovery Expedition, known as The Lewis and Clark Expedition.

1820 - On September 26th Daniel Boone died from natural causes at home in Femme Osage Creek, Missouri at the age of 85. About 20 years later, his body was exhumed and reburied in Kentucky. At the time of his death, six of his children had died. Only Jemima, Daniel Morgan, Jesse, and Nathan would outlive their father.



According to a display at Fort Boonesborough State Park, African Americans were part of the Boonesborough settlement from the beginning. Records refer to these inhabitants as someone's "negro" or "servant" and names were seldom listed. Much work needs to be done to document and tell the frontier African story. See the photos referenced. See the article by Harry Enoch in the RESOURCES



Monk Estill

Harry Enoch

Monk was probably the best known African American in early Kentucky, and his is still the most recognizable name today. He came to Kentucky with James Estill from Greenbrier County, Virginia. Estill visited Kentucky in 1776, perhaps with Monk along, then brought his family to Boonesborough in 1778. It was said that they were the first immigrants to arrive after the Big Siege. They remained at the fort for two years, until Estill established his own station on the headwaters of Otter Creek, near Twitty's Fort.*

Nathaniel Hart Jr. (1770-1844) remembered Monk and wrote of him many years later (1834). Monk was a noted slave, being the only man known to the author of this narrative who at that time made that most necessary article gunpowder, hence his arrival at Boonesborough, where he had a wife, was always anxiously looked for.*

This valuable skill was especially important on the frontier, where gunpowder was always in short supply. Some claim that Monk taught Daniel Boone how to make gunpowder. Boone left a brief description of the process he used:

Run your durt Like Ly after Lating it stand 24 hours then Boyle it one hour. Then Boyle your Brimstone till all the gaus is oute. Then Way your proportions, put them in a pott, stur thim togather till the Sulphur Melts and all unites With the Niter.*

James' estate inventory (1783) included "One Neagro fellow named Munk; Seventeen pound Saltpeter & brimstone mixt; and Sixteen pound Brimston.*" Saltpeter (potassium nitrate) and brimstone (sulfur) are two of the ingredients used to make gunpowder. George Michael Bedinger came to Boonesborough with a company of men from Virginia in the spring of 1779. He brought apple seeds that he gave to Monk who then planted and tended an orchard.

Major Bedinger brought out fully a quart of apple seeds; gave them to old Monk, a negro of Estill's, to raise trees upon shares. He made a fine nursery & though Bedinger got none, they were a great benefit to the country.*

Monk is also credited with the art of tanning:

He tanned garment-weight deerskins taken in their summer red coats; heavy elk and buffalo winter hides he made into quilts, saddle rugs, and shoepac leather, steeping them in rain-water-filled vats of shredded chestnut, hemlock, sumac, or oak bark oozing dark, acidic tannins that penetrated the raw skins, breaking them down for currying and softening.*

In 1780, James Estill established his own station a few miles south of present-day Richmond. Historian Ted Franklin Belue wrote that Monk

felled trees to erect into palisades, hauled wood and water and food, hunted, fished, planted an orchard, put out his own garden, and tended the garden of James Estill. In Peyton's Cave*, he mined saltpeter and guano for gunpowder.*

Monk is probably most famous for his role before and during what is known as "Estill's Defeat." The story begins with a raid by the Wyandot Indians at Estill's Station on March 20, 1782. The pioneer John Gass described that event for Rev. John Shane in his 1843 interview.

I had a sister killed at Estill's Station. It was March. I was going on 13 years of age. That night the snow had fallen. The sugar orchard was on the North West side from the Station. This was after Capt. James Estill's negro was taken. Sam Estill's negro Monk* had gone out with my sister, she to see if the trees were dripping (the sugar water was running), he to a clearing that was out there to haul some wood on the half sled. They saw the Indians first and made for the Station. My sister got within 60 yards of the fort, and could have escaped, but they, Indians, came across from the other side of the fort, quartering, and shot her.¹

Gass explained to Lyman Draper that Capt. James Estill was away from the fort that day. He had taken some 30 men out to "scour the hills" in search of the Wyandots who had earlier attacked Strode's Station.

Next morning, Monk, Estill's negro, went out to haul wood & was captured & the Indians told Monk of their being secreted [nearby] the evening before. Jane Gass [and] a negro [Dick] went out about the same time that Monk started to see if the maples were running. The Indians gave them chase and shot the girl when within about sixty steps of the fort, after she had run some three hundred [steps]. [She] was intercepted by the party that had captured Monk. The negro with Miss Gass made his escape.²

Monk was carried off by his captors. They had planned to attack the station. Monk, knowing that most of the men were away, convinced them not to try.

The Indians immediately and hastily retreated, in consequence of a highly-exaggerated account which Monk gave them of the strength of the station & number of fighting men in it.³

According to another source, Monk told the Indians that

there being forty men in the fort; that these had heard of Indians being in the country, and were then molding bullets for a pursuit and fight. There were really but four invalid men, besides the women and children. Undoubtedly, the ready sagacity of Monk saved these from a fearful massacre.⁴

Captain Estill's company soon struck the Wyandots' trail and began tracking them. On the morning of March 22, Estill's men fell on the Indians a few miles north of present-day Mt. Sterling, along the banks of Hinkston Creek, and a fierce battle commenced. Nathaniel Hart Jr. recounted that

Monk upon the first gun being fired, having broken from the Indians, rushed to his master informing him that he could easily whip them, and told their numbers. He took charge of the horses and was very active in mounting and conducting off several who were wounded.⁵

There were about 25 men engaged on each side of the contest. Estill sent Lt. William Miller with six men to flank the Indians. For unknown reasons, it seems Miller and his men left the field and withdrew from the fighting. At the end of the day, losses on both sides were about equal. Estill died on the battlefield. The contest was long remembered by Kentuckians as "Estill's Defeat."

James Estill's son Wallace described Monk's actions in the battle.

* This is a confusing statement, implying as it does that two "negroes" were taken. We think only Monk was captured, and he belonged to James not Sam Estill.

[T]hey came up with the Indians who were skinning a Buffalo they had killed. The Indians hearing the sound of the Horses feet, sprung to their guns, urged Monk the Negroe to run. Monk making great speed but shortly found himself entirely behind the Indians, then stopped and met his master Capt. Estill who was in front of his men. Ordered Monk to take charge of all the mens horses which he did. The whites got the first fire, wounding the Indian Commander as they were crossing a small creek.

Capt. Estill, knowing the Indian mode of fighting by Flanking ordered Lieut. Miller to defend the Left wing where the Horses were stationed with the Negroe man, Monk.

In a short time the Indians began to flank to the Right and left. Miller seeing the Indians Running Round on his side on something of Elevated ground and taking a great alarm cried out to his men Boys let us run or we shall be killed. Monk at the same time criing out to Mr. Miller, Pray do not leave us. Miller made a small halt, but hearing another gun fire at his men, they all Broke and Ran off the ground. Not one of Miller's men or himself were Firing a gun, which left the Ballance of the men nearly Surrounded by the Indians.⁶

A lengthy report of Monk's role that day can be found in Z. F. Smith's *History of Kentucky*.

A remarkable incident occurred during the battle, illustrative of the faithfulness and gallant bravery of the slaves, which were so often shown in times of peril to their masters and families. Monk, who had been captured, was still held by the Wyandottes. When the battle raged fiercely, Monk's voice suddenly rang out through the crack of the rifles and the forest echoes in rallying tones to the whites, "Don't give way, Massa Jim. There's only about twenty-five of the redskins and you can whip 'em!" Thus inspired, the Kentuckians fought on to the last.

Monk effected his escape in the confusion and carnage of the fight and made his way to the whites at the close.

He repeatedly rendered invaluable services to the garrisons at Boonesborough and Estill's by supplying them with powder he had dexterously learned to manufacture from saltpetre obtained in a cave, now known as Peyton's cave in Madison county. The worth of Monk was recognized by all around him, and his young master, Wallace Estill, gave him his freedom, besides clothing and feeding him at home for life, in token of his high regard for his faithful character.

When the Indians advanced [to flank Estill's men], Monk called out to Miller from the bushes in English, which the Indians did not understand, to stand his ground and they would win the fight. Upon the return home, without a sufficiency of horses, James Berry, with his thigh broken by a rifle ball, was carried mainly on Monk's back twenty-five miles to Estill's station.⁷

Another version of Monk's feat comes from John Gass:

After the battle, Monk carried [James] Berry, who was shot through the thigh, but not broken, to Strode's Station. Monk said the Indians were picked men, were determined to fight till they died.⁸

Yet another report had Monk carrying Berry to Boonesborough. It has been widely reported that James Estill's son Wallace gave Monk his freedom in 1782.⁹

Although Z. F. Smith cites few authorities, his version of Monk's heroics has been widely republished by others. Smith's concluding remarks about Monk offer a clue regarding his source for some of the information.

Monk Estill was a noble specimen of the colored race. He was treated with all the respect and affection of a member of the family in which he was once a slave, and by whom he was afterward made a freeman. One of the Estill family, Mr. Brown Lee Yates of Madison county writes of him now: "Monk was five feet five inches in height and weighed about two hundred pounds. He was the husband of three wives by whom he had thirty children. He was father of the first colored child, Jerry, born at Boone's fort, afterward a preacher in the Baptist church at Shelbyville. He [Monk] was a respected member, when white and colored lived in the same church together and broke bread at the same communion table. He was my near neighbor for twenty-four years and died about 1835."¹⁰

Smith's informant, Brown Lee Yates of Madison County, was a grandson of Samuel Estill, the brother of Capt. James Estill. Smith drew from articles Yates wrote that are now part of the Durrett Collection at the University of Chicago.

Madison County researcher, French Tipton, included Monk in his "Pioneer Sketches." Monk

Estill, a servant of Capt. James Estill, who came with him to Boone's Fort in 1776, had the best of health and lived a full measure of days in Madison County.... He lived to

see a time of peace when the red man had retired from the battlefields of Kentucky.

Monk was born a slave for life, but his young master, Wallace Estill, set him free, which he enjoyed fifty-five years, without worldly cares, being fed and clothed. He was a devout man in all his ways; was held in high estimation in his church, when white and colored communed together. He was an ornament to his race and generation; was the husband of many wives and the father of many children. He died like a philosopher; was weary of life; anxious to go. He died in August 1837, of flux; was buried at Estill's new station near William Cradlebaugh.¹¹

Tipton gave no sources. Part of his information is derived from Z. F. Smith, but where he learned about Monk's death and burial is unknown.



Widely reproduced woodcut of Monk Estill that first appeared in Z. F. Smith's *History of Kentucky*.

In 1843 John Gass, who knew Monk well, told Rev. Shane that "Monk has not been dead but 2 or 3 years."^{*}

Further information about Monk comes from an article by Anne Butler. Looking through the Richmond Cemetery records she found the name "m. Estill" in the Estill family plot indicating that Monk may have been buried there.^{*}

She also located an 1891 newspaper article about Monk. The reporter stated that a monument was being erected in the white cemetery in Richmond to honor Monk Estill, an enslaved African American proclaimed for his heroics in a battle with the Wyandottes in 1782.^{*}

Dr. Butler added that "With the passage of time, however, the monument honoring Monk Estill either did not come to fruition or it disappeared from the Richmond Cemetery."^{*}

¹ John Gass interview, Draper MSS 11CC 15.

² John Gass interview, Draper MSS 24C 73(23-24). Dick's name comes from Bessie Taul Conkwright, "Estill's Defeat or the Battle of Little Mountain," *Register of the Kentucky Historical Society* (1924) 22:313.

³ Charles A. Stuart to Draper, 1845, Draper MSS 8ZZ 20.

⁴ Account attributed to pioneer Joseph Proctor, in Zachariah F. Smith, *History of Kentucky* (Louisville, KY, 1886), 189.

⁵ Nathaniel Hart Jr. to Mann Butler, in Butler, *History of the Commonwealth*, 516.

⁶ Wallace Estill to Draper, Draper MSS 13C 53-53(1), 54-54(1-3)

⁷ Smith, *History of Kentucky*, 193-194.

⁸ John Gass interview, Draper MSS 24C 73(29).

⁹ See, for example, Belue, *Hunters of Kentucky*, 179.

¹⁰ Smith, *History of Kentucky*, 193-194.

¹¹ French Tipton O Book (original Book 5), p. 7, Eastern Kentucky University Library, Special Collections, Richmond, KY.



AFRICAN AMERICANS ON THE KENTUCKY FRONTIER

Harry Enoch

An early observer on “African slavery in Kentucky” was Zachariah F. Smith in his 1886 *History of Kentucky*. Smith may have originated the concept that the solitude of the wilderness and isolation of the settlements fostered a companionship between slave and master that led “to the contentment and happiness of both.” “If Uncle Ben and Black Sam felled the trees for fencing...Mars Tom often bore a hand with them [etc.].” Males and females of both races worked together and played together, with the result that the “white and colored elements were thus pleasantly blended in the household unit, ever respective of the differences which nature and fortune had prescribed.”¹

Smith’s naive views were little altered in the judgment of many 19th and early 20th century writers. J. Winston Coleman, and his influential book, *Slavery Times in Kentucky*, may have been the greatest popularizer of this myth. Coleman launched into his argument on the first page of the Introduction and continued it throughout the book: that Kentucky’s “system of bondage was the mildest that existed anywhere in the world.” On page 6 he even repeated some of Smith’s verbiage word for word: “If Uncle Ben or Black Sam felled the trees....” Coleman averred that Kentucky planters felt “their slaves were a trust” to be held and used as humanely as possible. As an example, he referred to Robert Wickliffe, the largest slaveholder in the state, whose will provided that his “two hundred Negroes” be given the day off to attend his funeral. Moving into deeper waters, Coleman wrote that many Kentuckians had no desire to hold their slaves in bondage but “believed that in doing so they did whatever was best for the slaves themselves.”¹

In spite of overwhelming evidence that white fortunes were built on the backs of enslaved labor, Coleman opined that “Slavery in the Bluegrass State...was much more a *domestic* than a *commercial* institution.” The term he coined for it was “benevolent bondage.” He claimed that the few “disparaging accounts of Kentucky bondage...were written for the most part by Northern abolitionists.” Kentucky slaves were “happy and contented” as substantiated “by the number of newspaper accounts of runaway slaves, who, after experiencing a ‘spell of freedom’ in Northern territory, often in Canada, were glad to return to their old homes and masters.”¹

Recent scholars have taken a more thoughtful approach to the problems African Americans faced on the frontier.

Dr. Marion Lucas treated the subject in a 1997 article in the *Register of the Kentucky Historical Society*. After decrying the fact that African Americans have essentially been omitted from Kentucky’s early history, he compiled a list of blacks who entered the frontier along with the first whites to explore the region.

In 1751 Christopher Gist’s black “servant” accompanied him on a trip down the Ohio River to the Falls of the Ohio, today’s Louisville, then through Kentucky.¹ In 1760 Daniel Boone and Nathaniel Gist met a slave named Burrell, who led them to the crest of the Blue Ridge and on to hunting grounds in the area of southwest Virginia. There were several blacks in Boone’s party that attempted to settle Kentucky in 1773. Charles was captured and later killed by the Indians; Adam hid in the brush and watched the Cherokee band torture and kill Boone’s son James and William Russell’s son Henry.¹

Lucas went on to identify a number of African Americans who came in with the first settlers to Boonesborough and helped defend the frontier fort. He then raised two points. First, survival involved “a strong interdependence among blacks and whites...on the Kentucky frontier.” And second, “facing the hostile environment of wilderness and Indians, and given their status in white society, slaves had few viable options.” Running away would be easy, but more likely to lead to death than freedom.¹

He then asked a simple question. “Given their important role in the founding, building and populating Kentucky, what fruits did they share once the frontier dangers ended? The answer to this question does not speak well for pioneer white Kentuckians.” While enjoying the products of black labor, they saw no reason to share the benefits with them. Instead they chose to institute the system of chattel slavery as it existed on the South Atlantic coast. A major obstacle for African Americans on the Kentucky frontier was the “struggle against a view held by whites since the sixteenth century that blackness, in and of itself, meant permanent bond slavery.” When Kentuckians formed their own constitution in 1792, they adopted all of Virginia’s laws regarding slavery, in spite of a strong church-based emancipation movement.¹ The 1798 Legislature adopted the “Slave Code” forbidding abusive treatment of bondsmen, which one historian labeled a “legal fiction.” Slaves and free blacks contributed greatly to Kentucky’s early prosperity, but “their rewards were few.”¹

Stephen Channing accepted the notion that Kentucky’s small slaveholdings made for a different system than that of the Deep South. “But it is possible to exaggerate the importance of that comparative difference. Apologists developed a powerful mystique around it, using [it] to argue that slavery was relatively inconsequential to whites, and that it lay upon the shoulders of its subjects like a feather. The evidence speaks otherwise; for, while Kentucky had no system of vast plantations, and most of its owners held few slaves, the state’s agricultural economy was undeniably dominated by farmers who were slaveholders.”¹

In her essay on the subject, Dr. Ellen Eslinger concluded that one overriding concern affected both whites and blacks, namely, “the prolonged Indian Wars [that] dominated western life for nearly two decades.”¹ That danger affected blacks more than whites in three important ways: “personal survival, material conditions, and social organization.”¹

First, “slaves who were brought to the frontier endured every hardship and danger encountered by their white owners, and as inferior members of the household, their suffering probably exceeded that of white pioneers.” Many blacks participated in the defense of white settlements, including Fort Boonesborough. And many died at the hands of the Indians, whose grievance was actually with the whites.¹

Secondly, the isolation of the frontier settlements like Boonesborough meant a subsistence level survival. Pictured as self-reliant providers, whites actually relied upon their bondsmen to supply much of their needs. Eslinger recounted the fate of John Floyd’s servant Bob. During the Hard Winter of 1779-80, Floyd huddled with his family in a log cabin while Bob languished in a crude lean-to with an axe wound to his foot. Frostbite led to gangrene and, after lingering for three months, Bob finally died.¹

Thirdly, the isolated and dispersed settlements affected slaves more. They suffered a painful separation from their friends and family in Virginia and North Carolina. Then in their new home, restricted mobility meant they had little opportunity “for social interaction and family formation.” The problem was perceived as especially acute for young men. Thus, “most slaves were probably unwilling pioneers.”¹ In short, slaves had little to gain yet shared all the risks and discomfort of western life. Eslinger concluded her essay: At the very least, the material presented here seriously challenges J. Winston Coleman’s classic statement that slavery during Kentucky’s frontier period was “the mildest that existed anywhere in the world.”¹

Finally, Juliet Walker took up the question of the status of free blacks on the frontier.¹ In theory, “ownership of property, unrestricted mobility, and protection of the sanctity of the family are considered qualifying indicators that distinguished the lives of free blacks from slaves.” These did provide an advantage for free blacks during the frontier era. Eventually, however, “restrictive social and economic conditions circumscribed the lives of Kentucky’s free black population.” Henry Clay would later declare that The laws, it is true, proclaim them free. But prejudices more powerful than any law, deny them the privileges of freedom.¹ There were two free blacks at Boonesborough: Richard Hines and John Sidebottom (see Biographical Sketches).

Contemporary Accounts

The settling of Boonesborough began with the journey to Kentucky. There were two separate parties that came out in 1775. Daniel Boone’s “road cutters” that formed the lead party set out from Sycamore Shoals on the Wautaga River (now Elizabethton, Tennessee) in early March and arrived at the Kentucky River on April 1. There were at least two African Americans in his party—Sam, a servant of Capt. William Twitty, and Dolly, a servant of Richard Callaway—and perhaps more.

None were named in contemporary accounts. Richard Henderson and his party of settlers trailed behind Boone’s, arriving at Boonesborough on April 20. We know there were blacks in that group also, but, again, none were named in contemporary accounts.

On March 25, Boone's camp, about 4 miles south of present-day Richmond, was attacked by Indians just before daybreak. Here we begin to discern the problem of documenting the role blacks played in the venture. Boone sent a letter back to Henderson describing their misfortune. On March the 25th a party of Indians fired on my company about half an hour before day and killed Mr. Twitty and his negro, and wounded Mr. Walker very deeply.¹ None of the contemporary reports mention that Twitty's negro was named Sam. Felix Walker later composed his own narrative of the journey, but his version adds little detail. Captain Twitty was shot in both knees and died the third day after.... A black man, his body servant, was killed dead; myself badly wounded.¹ At this period, all contemporary references to enslaved men and women used the term "servant" or "negro." Henderson received Boone's alarming news on April 7, which he recorded in his daily journal as follows: [This] Day Received a Letter from Daniel Boone that his Company was fired upon by Indians. Killed Two of his men, tho he kept the ground & Saved the Baggage &c.¹ William Calk, who had joined Henderson's party en route, arrived at the fateful location on April 19.

However, the version recorded in his famous journal of the trip is even less informative. about 11 o'clock we come to where the indians fired on Boons Company & Killed 2 men & a dog & wounded one man in the thigh.¹ Calk's diary describes Henderson's party as "Being in number about 40 men & Some Neagros."¹ None were named, and he wrote nothing further about any of these men and women. Another example of a nameless black again comes from Richard Henderson. In a letter to his partners in North Carolina, he described his elation upon finally reaching Boone's fort on April 20. I questioned if a happier creature was to be found under the sun. Why do I confine it to myself; it was general; the people in the fort, as well as ourselves, down to an old weather-beaten negro, seemed equally to enjoy it.¹ This defines the first problem of telling the story of African Americans at Fort Boonesborough: The blacks in Boone's and Henderson's companies and many who came to Boonesborough later were not named. We have had to mine other sources to fill in those blanks.* * *The second problem is more pervasive. In almost all accounts penned before Emancipation, the role African Americans played in settling the frontier is simply omitted. So silent is the record, it is almost as if they were not there. An example of this problem begins early on at Boonesborough—during construction of the fort. Richard Henderson's journal describes the process, beginning on April 27. Employed in clearing fort lot &c. Mr. Luttrell, Nathaniel Henderson & Samuel Henderson¹ all that assisted me.¹ We know Henderson's party arrived at Boonesborough with an undetermined number of "Neagros." So it seems improbable that these four white men set to work without their assistance. Clearing the brush and trees from the fort site would have been exhausting physical labor. Richard Henderson and John Luttrell were both considered "Gentlemen," certainly not accustomed to that kind of work. More likely, they directed the labor of the enslaved men they brought with them, which is suggested by Henderson's diary entry on the 28th. Mr. Luttrell chose a piece of ground about 3/4 of a mile from the fort & Set *three of his people* to work. *2 remained with me* to Assist with clearing about where the fort is to Stand.¹ Luttrell took three of his men off to work with him and left two to work on the fort with Henderson. "His people" were not his sons—he had none. The implication is that "his people" were Luttrell's slaves, who would not have been allowed to sit around while white men were working.

We will learn later (Biographical Sketches) that these men did have slaves at Boonesborough, namely, John Luttrell's Grampus, Richard Henderson's Dan, and Nathaniel Henderson's London. This type of omission forms a familiar pattern in contemporary accounts of Kentucky's settlement period; that is, white men describing their own deeds—clearing land, building cabins, planting and tending crops, fighting Indians—while failing to mention that many of their accomplishments were the work, in whole or in part, of enslaved men and women who were brought to the frontier by their owners.

In October 1776, Virginia established Kentucky County, encompassing most of the present-day state, and appointed George Rogers Clark to command the Kentucky militia. In March 1777, the newly organized militia held musters at the three forts then occupied—Boonesborough, Harrodsburg and Logan's Station. At Boonesborough "twenty-two men defended ten to fifteen families and ten to fifteen slaves of all ages."¹

The impression given above that 22 white men were responsible for defending all the blacks is misleading. In times of crisis, blacks were given weapons in order to assist in the fort's defense. This was documented in a deposition by fort resident, William Buchanan. In speaking of the Shawnee siege, September 7-18, 1778, Buchanan stated that arms & ammunition were given to the negroe men in the Fort, and stationed by the commanding officer in such a manner so as to make the best defence possible.¹ During that siege by 400 plus Shawnee and French Canadians, Nathaniel Henderson's servant, London, was one only two men killed at the fort. In perhaps the most remarkable example of anonymity, Henderson's lengthy petition to the Virginia General Assembly for restitution for the loss of "a valuable negro fellow" never mentioned London by name. The above mentioned Buchanan submitted his deposition in support of Henderson's request, which also failed to mention London's name. Long after he left Boonesborough, Nathaniel Hart Jr. recalled that Many of our slaves were gallant soldiers.¹

We shall have more to say on this subject in the Biographical Section. There are many examples in pioneer Kentucky of blacks defending the white families they were bound to. Ironically, after Kentucky became a state, laws would be passed making it a crime for blacks to own, possess or use weapons of any kind—even in self defense.¹ Other blacks at Boonesborough died anonymously. On March 7, 1777, Indians attacked the fort. A party of Indians, probably detached from Black Fish's main body, appeared at Boonesborough and managed to kill a Negro in the field at work and wounded another person.¹

Boonesborough settlers were always at risk from Indians lurking near the fort. Their ambushes took a toll on blacks and whites alike. Those out hunting, tending to livestock, or working in the fields were in constant danger of being killed or captured. One of the petitions to the Virginia Assembly listed 21 men killed at Boonesborough, and 31 men and 3 girls captured by the Indians from 1775 to 1779. Not one slave name was on the list, although a number were known to have been killed and captured—another example of their "invisibility" to whites. (The list did include the free black, Richard Hines.)

Dr. Thomas Walker took a "servant" along on his exploration of Kentucky in 1750 for the Loyal Land Company.

¹ Kentucky was the first state to give slavery Constitutional protection.

¹ From 1775 until General Wayne's victory at Fallen Timbers in 1794.

They were only 15 miles from the Kentucky River and future site of Boonesborough.

¹ Nathaniel and Samuel were Richard's brothers. John Luttrell was a member of the Transylvania Company.

Marion B. Lucas, "African Americans on the Kentucky Frontier," *Register of the Kentucky Historical Society* (1997) 95:121-122.

¹ Ibid, 128.

¹ Ibid, 132-134.

¹ Stephen A. Channing, *Kentucky, Bicentennial History* (New York, NY, 1977), 95.

¹ Ellen Eslinger, "Shape of Slavery on the Kentucky Frontier, 1775-1800," *Register of the Kentucky Historical Society* (1994) 92:1-23.

¹ Ibid, 1, 16-18.

¹ Ibid, 29.

¹ Ibid, 6, 19-22.

¹ Ibid, 23.

¹ Juliet E. K. Walker, "Legal Status of Free Blacks in Early Kentucky, 1792-1825," *Filson Club History Quarterly* (1983) 57:382-395.

¹ Ibid, 383.

¹ Daniel Boone to Henderson, Draper MSS 17CC 166.

¹ Felix Walker's Narrative, in George W. Ranck, *Boonesborough* (Louisville, KY, 1901), 164.

¹ Richard Henderson's Journal, Draper MSS ICC 21-102.

¹ Harry G. Enoch, *William Calk's Journal of a Trip to Boonesborough in 1775* (Winchester, KY, 2011), 16. Calk's journal is online at the Kentucky Historical Society, www.kyhistory.com/cdm/ref/collection/Calk2/id/6.

¹ Enoch, *Calk's Journal*, 13.

¹ Henderson's letter of June 12, 1775, copied in Lyman C. Draper, *Life of Daniel Boone*, Ted Franklin Belue, editor (Mechanicsburg, PA, 1998), 345.

¹ Henderson's Journal, Draper MSS ICC 21-102.

¹ Ibid.

¹ John Mack Faragher, *Daniel Boone, Life and Legend of an American Pioneer* (New York, NY, 1992), 146.

James R. Robertson, *Petitions of the Early Inhabitants of Kentucky* (Louisville, KY, 1914), 45.

¹ Nathaniel Hart Jr. to Mann Butler, in Mann Butler, *History of the Commonwealth of Kentucky* (Louisville, KY, 1836 edition), 517.

¹ William Littell, *Statute Law of Kentucky, Vol. 2* (Frankfort, KY, 1810), 113.

¹ Draper, *Life of Daniel Boone*, 439.



Thoughts on The First Settlers, the Path Through History, and Children Living on the Frontier By Mary Hufford, PhD

The land surrounding the Kentucky River and its tributaries has changed tremendously over the past three centuries. Yet many things that grow now in the fields and forests also grew there when settlers were raising their families. Some of those plants were new to settlers, and some came to North America from Europe and Africa. The forests and fields shaped by centuries of Native American use contained much that the settlers learned to use. Hickories provided materials for weaving chair bottoms, mountain locusts offered sturdy, rot-resistant posts for fences, chestnuts made straight rails. Sassafras provided flavorful tea, oak bark could be used to treat mouth infections in babies (called “thrush”), deer antlers became knife handles, paw paw branches were turned into whistles! The banks of many of the tributaries of the Kentucky River were lined with river cane, the only kind of bamboo that is native to North America. These places were called “canebrakes,” and are remembered in names for many tributaries of the Kentucky River, such as Caney Fork, Caney Fork, Caney Branch, Caney Gap and more. *Arundinaria gigantea* was cultivated by Cherokee who used it in making baskets, fishing equipment, and tools for hunting, including blowguns, arrows, and spears. They made flutes, duck calls and whistles for children. Settlers also used river cane to make household goods, fishing poles, and forage for livestock. But over time, European methods of agriculture and forestry displaced the river cane, so that now it’s less common than it was when the settlers came. But river cane could be a good tool for watershed restoration, because of its strong ability to hold up river banks.

Children of settlers may also have played with some of the same plants that you know, which Settlers brought with them from the old world, including dandelions and plantain. Does it surprise you that dandelions are not native? You may have heard of dandelion salad, dandelion coffee, and dandelion wine, which use the leaves, blossoms, and roots of this plant. But dandelion *seed heads* have long been known among children as “wishers” or “clocks.” Have you ever made a wish and blown on a dandelion wisher to get the wind to carry your wish off to come true? Children in Europe continue to do so too! Some children have also used dandelion seed heads to tell whether it’s time to go home – the number of seeds left on the head after you blow on it tells you whether you still have time to stay out and play. That’s how dandelion seed heads got the name “clocks.” Have you ever dueled with a friend by popping plantain tops? Or sparring with two plantain stems until one of the tops breaks off? How do you know who won? There are so many games that children have played, using plants, for centuries. Have you ever sipped honeysuckle blossoms or yellow poplar petals? Or popped touch-me-not seeds in the fall? Or made a loud whistle using a blade of grass? Or made dolls out of hollyhocks? Or floated boats made of nut shells and leaves? Can you think of other games that you’ve learned to play using parts of plants? Think of how these plants that stay the same over the centuries can connect you with children in places all over the world, in times long past and yet to come!

By the way, broad-leaved plantain is still used as a remedy for cuts, because a poultice made from the leaves can fight bacteria and inflammation. Settlers brought this valuable medicine with them from Europe and carried it all over North America. The plant is known among Native Americans as “white man’s footprint,” because it indicates that Europeans have been here. Dandelions and plantains are non-native, but they are said to have naturalized, adapting to conditions they found here. Other introduced species, such as autumn olive, multi-flora rose, Japanese barberry, Japanese honeysuckle, and Japanese stiltgrass take over habitats and drive out native species. How can we live with the land in ways that restore native habitats and allow native species to flourish?

The First Settlers and the Path Through History

While there is no evidence that Europeans visited or explored within Kentucky's borders until after the mid 1730's, during the mid-1500's Spanish explorers (De Soto's Expedition) traveled through the Southeast. Not until the mid to late 1600's did the French and English sporadically, appear along Kentucky's eastern and western borders.

Daniel Boone is a well-known figure in the history of Kentucky as an American pioneer and frontiersman because he helped blaze a trail through the Cumberland Gap into Kentucky. He was born in Pennsylvania on November 2, 1734. It is reported that he had little schooling, and he spent most of his life as a wandering hunter and trapper. His mother taught him to read and write, while he learned wilderness survival skills from his father. He did not show fear like others his age and shot his first bear with a rifle he was given when he was 12 years old. At age 15 Boone moved with his family to the Yadkin River in North Carolina where he started his own hunting business. He is described as a modest, good-natured fellow who rarely lost his temper and went out of his way to avoid conflict. On his hunting expeditions he reportedly went as far south as Florida and as far west as Missouri.

In 1755, he left home on a military expedition that was part of the French and Indian War, serving under Brigadier General Edward Braddock during the defeat at Turtle Creek.

In 1756, he married Rebecca Ryan and set up his family in the Yadkin Valley. They would have 10 children together, six sons and four daughters. At first, he found himself content with "A good gun, a good horse, and a good wife", but then his interest in exploring the American frontier was ignited, and he disappeared for days or sometimes months into the Appalachian Mountains.

In 1767, he led his own hunting expedition for the first time into Kentucky. He went again with several companions to trap and hunt and in 1769 they discovered the Cumberland Gap. Reportedly they did not return with much. However he had gained lots of knowledge about Kentucky and north central Tennessee during his explorations. Daniel Boone and others used the riverbanks to hunt, trap, and fish. They used canoes styled after the Indian dugout canoes. Stories of those times tell of huge fish in the river and large numbers of squirrels.

In the 1769 Treaty of Stanwix, the Iroquois gave up all the land they had claimed south of the Ohio River, leaving Kentucky to be settled. This also, blocked the Iroquois and Shawnee and other tribes from hunting there. In 1772, the Cherokee surrendered their claim to Kentucky to the colony of Virginia.

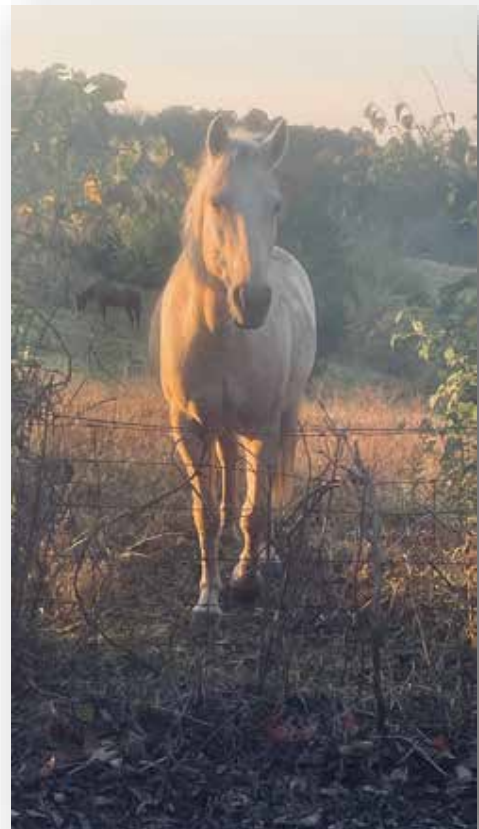
In 1773, Boone took his family and several other families to Kentucky where they were attacked by Cherokee Indians. His eldest son James and another member of his party were captured and murdered. While this event made the settlers turn back, Boone was not deterred.



Re-enactors at Boonesborough State Park



Reproduction Cabin at Fort Boonesbough State Park.





Imagination, illustration from the **Toys and Games of Appalachia**,
Linda Pack, Illustrated by Pat Banks



Handmade doll from felted fabric. This same technique of felting fabric was used to craft hats.

In 1774, James Harrod brought his pilgrims down the Ohio River, to the Kentucky River near a spot that is now Shaker Landing in Mercer County. From there, they ventured across the countryside to build the first settlement, Ft. Harrod, in what is now Harrodsburg. During this time the British requested trade restoration as trade was impacted by scarcity of goods. In 1775 (Treaty of Sycamore Shoals), the Cherokee sold their land to the Transylvania Land Company. Some Cherokee were not pleased with this treaty as they believed that the presence of the settlers would end their way of life. They continuously raided frontier groups traveling into Kentucky.

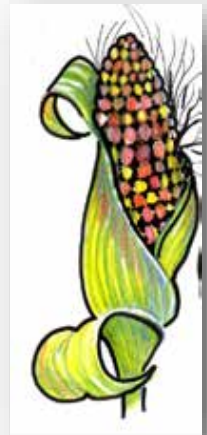
Daniel Boone took employment with the Richard Henderson Company in 1775, along with 28 companions. The goal was to blaze into Kentucky through the Cumberland Gap and to establish Kentucky as a part of the trail to America's western frontier. Not discouraged by Indian attacks, they built the Wilderness Road from eastern Virginia into the interior of Kentucky and beyond. This was the main route to the west and made it possible to build Kentucky's second oldest European settlement, Fort Boonesborough, after they crossed the Kentucky River on April 1, 1775. Kentucky's origin as the first of the western territories depended on the river for transportation, food, water, and safe travel.

In ever increasing numbers, settlers began moving into Kentucky with all their belongings. The American Revolutionary War broke out in 1775 and with that violence increased between Native tribes, and the settlers in Kentucky. These tribes, mainly Shawnee, from north of the Ohio River, raided Kentucky settlements hoping to drive the settlers away. The Cherokee also frequently attacked isolated settlers and hunters with the same goal of hoping to drive them away.

On July 14, 1776 a raiding party of two Cherokee and three Shawnee warriors led by a Cherokee, caught three teenage girls as they were floating in the Kentucky River, near Fort Boonesborough. One of them was Jemima Boone, daughter of Daniel, and two daughters of Colonel Richard Calloway. They raised alarm and Boone organized a rescue party, but the captors rushed the captives towards Shawnee towns across the Ohio River. The girls tried to mark their trail but were hindered by their captors. On the third morning, the rescue party caught up with the captors. In a skirmish, Boone wounded several of the captors. There are several accounts but the raiding party retreated and left the girls to be taken home to the settlement.



Handmade
corns shuck
doll with nat-
ural fleece
yarns and
woven fabric.
Made at
Boones-
borough.



Because of increased conflicts, Settlers began leaving the region. By early 1776, fewer than 200 settlers remained in Kentucky, mainly in the forts of Boonesborough, Harrodsburg, and Logan's Station. Conflicts between settlers and natives were exacerbated by the American Revolutionary war. Many of the tribes were allied with the British. These conflicts lasted until the early part of the 1800's. Many conflicts occurred over the transporting of goods in and out of the area. Daniel Boone and others told many stories of these encounters.

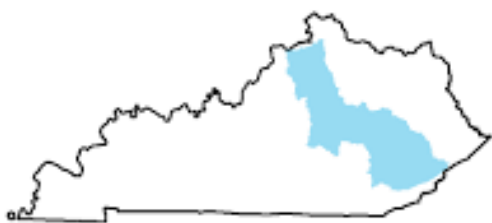
In 1778, as Boone was traveling with a group of Boonesborough men along the Licking River, he was captured by a group of Shawnee who took him to their village in Ohio. Chief Blackfish adopted him in place of a son that had been killed. They gave Boone the name Sheltoewe (Big Turtle). He was allowed to hunt and have some freedoms, but they kept a close eye on him. It is reported that he may even have had a Shawnee wife. In June of 1778 Boone learned of an imminent attack planned on Fort Boonesborough. He escaped back to Boonesborough to warn the settlers of the planned attack. Over the course of nine days, a group of Shawnee and other tribes laid siege to Boonesborough. Even though the settlers were outnumbered, they managed to hold the attackers off.

The American Revolutionary War lasted over seven (7) years and ended in 1782. By this time there were 12,000 settlers in Kentucky and 72 settlements in the Lexington area. Fort Boonesborough and Harrod's Town survived the attacks by the British and their native allies. Despite treaties between the settlers and the native tribes, land was stolen, and acts of retaliation continued. In 1792, Kentucky was admitted as a state, but the fighting continued. The ever-increasing European population used the Kentucky River for transportation of wares in and out of the region.

While the Treaty of Greenville in 1795 closed the long period of conflict in Kentucky, the distrust and resentment continued. The treaty conference was attended by about 1000 natives from many tribes. They believed this treaty would guarantee they could live and hunt in their ancestral lands. They did not know that this was the beginning of the Indian relocation programs and acquisition of the lands east of the Mississippi. Among other things, the treaty declared that the American government had influence within tribal governments and that the US government had committed to "civilizing" American Indians. There is so much more detail about these struggles available to the student and historian. We have tried to give a basic context to this complicated story. Some of these struggles and issues follow us today in social justice and environmental concerns.



Check out the **HANDOUTS** for the **Study of Leaves and Maple Tree Branch and Cardinals**, Sketch these to help you see your local plants and animals and then discover more through your own observations and research. These are the same plants and animals that natives and settlers saw!



Contour Map of the State of Kentucky. The blue highlighted area is the Kentucky River Watershed. The Kentucky River flows north to the Ohio River, to the Great Mississippi and the into the Gulf of Mexico.

What happens in Kentucky can effect what happens in the Gulf of Mexico and eventually the world!

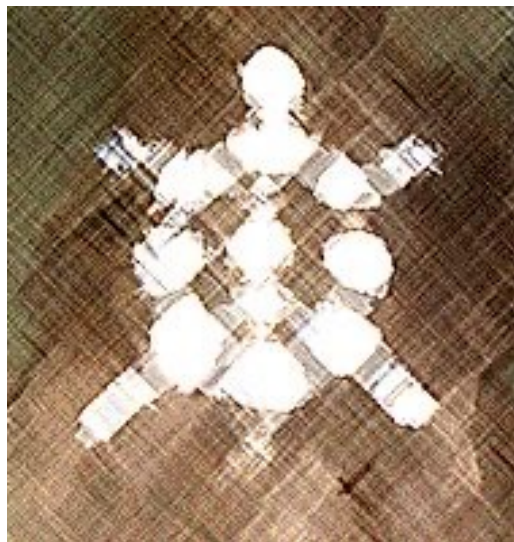
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Trade and Land Ownership – Natives, European Explorers, and the Settlers

In general, many conflicts arose from the very different ways Native people and Europeans thought about land. Europeans saw land ownership as a way of achieving personal and economic independence which was not possible to attain in Europe at the time. They used deeds, surveys, and written documents as a basis for property rights.

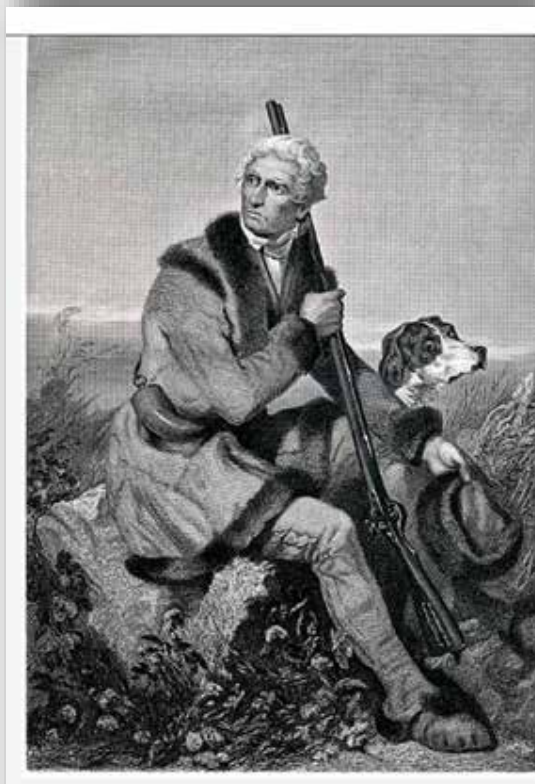
Native American tribes did defend their territories against invaders. They used certain tracts of land for hunting, farming, and fishing, but they did not “sell” these rights to each other. The practice was to ask for permission to use or cross each other’s land. It was common to relocate a village to another area in order to let the land regenerate.

Ecologist M. Kat Anderson describes an “usufruct system”, in which land ownership is defined as a right to use land but not to possess it. Anderson further wrote (Do All Indians Live in Tipis, p. 97) that under the usufruct system, “each family had a combination of exclusive rights to certain resources and communal rights to other resources”. For example, an oak tree might be individually owned while others might be owned by a tribe. In general, Native tribes’ understanding of accumulating wealth was not the same as that of the Europeans, so there was no need to sell or buy land. When they “sold” their land to the Europeans, the Native tribes thought they were still retaining the rights to use resources in certain areas, just as they would do with agreements with other tribes.



Chief Blackfish adopted him (Daniel Boone) in place of a son that had been killed. He gave Boone the name Shelto-wee (Big Turtle).

This is also the symbol of the Shelto-wee Trace. Is a 319 mile National Recreational Trail that Spans the Daniel Boone National Forest.



Daniel Boone Portrait

Trade continued:

Native tribes would “sell” the same plot of land to different buyers repeatedly, which naturally led to conflicts and clashes. Eventually, the Native tribes understood the differences in European and traditional native land practices, ownership, and use. The tribes started to educate their members to understand the European legal documents and negotiate for continued rights to use the land. They learned how to include those rights in legal documents and titles.

Despite conflicts, trade between the settlers and native tribes flourished, even though trading was as disruptive to native culture as the land conflicts. Before the Europeans, native people killed only enough deer or game for their needs. They were careful not to overhunt and they maintained grazing areas by using controlled burns of forest underbrush. Because of trade, native hunters started to over hunt game to trade for Europeans goods, and by 1730's this led to a decline in the deerskin and fur trade. While traded goods like scissors, knives, and iron pots made life easier for native women, the trade also changed gender roles.

Previously native women had processed skins and made clothing, bedding, and other necessities for their families and for trade. According to Judy Sizemore in “Strong Voices: Native American Women of Kentucky,” women generally owned the homes and could divorce a husband and retain their homes. They (Women) made the decisions about childbearing and controlled the usage of land.” Women’s councils also played important roles in the tribe’s decision-making process, “...often selecting the council members and making decisions on issues like war and peace.” As trade increased, finished cloth and clothing began to replace the women’s traditional roles. Native women were left out of trade arrangements and negotiation as male Europeans traders would not negotiate with native women. Also, some traders began to settle into native villages which caused social structures and economic changes to happen rapidly. Households and families began to be established between traders and native women. They usually tended to follow the patterns of the European family structure. The children of those families were influenced and impacted by both cultures. These families increased in numbers and were often resented by traditional native leaders and European communities alike.

Further, the United States government forced Native Americans to give up more and more land and began pressuring them to move west. Many natives saw the only way to keep their ancestral lands was to adopt the ways of their European neighbors, including adopting formal government structures and leaving women out of those structures. Natives were further displaced by the “The Trail of Tears,” a forced march to Indian Territory into present day Oklahoma. This resulted in further battles for land, rights, and many other complex issues. Of note, small groups of families and individuals disappeared into secluded areas to survive throughout the region. Perhaps the most noted and recognized are small bands of natives, mainly the Cherokee, that escaped into the mountains of North Carolina to establish their own hidden communities until officially being recognized as the eastern Cherokee band and granted land to establish the community of Cherokee, North Carolina.



Quality clay is readily available in the Kentucky River Watershed and made the production of pottery a source of pride and trade.



A skilled wood worker, carver and carpenter were highly valued member of the settlers community. They helped with the expertise for building homes, making tools and utensils , furniture, wagons, barrels and numerous other products the settlers needed for their homes and villages.

Life of Children on the Frontier in the Kentucky River Watershed

Imagine arriving in a new place, settlers had to start with the basics. They need-ed a place to live so they had to build a house! To do that, land was cleared, trees felled and shaped into logs, and building materials were secured before a cabin could be built. Crops had to be planted when the season was right. Many other tasks had to be completed. The only chance of survival was for the entire family to work together. As soon as children were old enough, they needed to help with daily tasks, even if they were just four or five years old. Tasks like getting water from the river, stream, or well, keeping the animals fed and tend-ed so they would not get into the crops, milking cows, and churning the milk into butter were examples of tasks children were taught to do.

As children grew older, their jobs would become more difficult and required more skill and included more responsibilities. Boys would often chop wood to build fires for cook-ing and warmth, learn to hunt with their fathers, help plow the fields, and build out buildings. If their fathers or mothers had a special artisan skill like black-smithing, they would probably learn those skills too.

Girls would often take care of their younger siblings and help their mothers and grandmothers with the household chores. The settlers made their own soap (lye, water, ashes), spun flax or wool into thread or yarn, wove thread or yarn into cloth, raised a kitchen and flower/medicine garden, sewed and repaired clothes, made candles, cooked over an open fire, preserved food for winter, and made baskets and anything else they might need! When clothes became so tattered that only small pieces could be salvaged, women would sew them into quilts, or bed covers (i.e., "Crazy Quilts" that used lots of different fabrics and sizes of materials). A visit to Fort Boonesborough, today, will include a demonstration of the skills practiced during frontier times such as soap making, candle making, weaving, blacksmithing, basketry, quilting, broom making and more.

Not all, but some frontier children were lucky to have a chance to have an education. They learned to read, spell, write, figure (math), and learn some history, in a local one room schoolhouse taught by one teacher. Imagine that their mother might have packed the children's lunch from the leftovers from dinner the night before. The children would usually get up early to do their morning chores, feed the chickens, get water, bring in firewood, then walk to school. Sometimes each student would bring a piece of wood to contribute to the classroom stove or fireplace so they all could keep warm in the winter. All the grades were usually taught together. The students did not write on paper but used pieces of slate for chalkboards. On the way home students would keep a watch out for a rabbit, squirrel, ground hog or other favorite game, to bring home to their mother to add to the soup pot. It also helped with their hunting skills. In the spring and fall, however, the children had to leave their studies to help plant and harvest on the farm instead of going to school! This practice is still used today. We have summer vacations, but some of us still work in our gardens or help on our farms!



Re-enactor at Fort Boonesborough St Park



This painting (Toys and Games of Appalachia) is based on the Desarn reconstructed one room school house, located in Madison County.



Crazy quilt, see RESOURCES.

Historical Crazy Quilt in the White Hall Collection

Contributed by Brian Marshall, member of the Friends of White Hall State Shrine Board.

Richmond, Kentucky

To the State of Kentucky and it has been accepted by the State after being renovated in the future it will be opened to the public and no doubt it will become one of the tourist attractions. Curator will be in residence at all times. Mrs. Nunn vice I am this as a project to work on while she is at the Mansion.

Grandmother Scott wife of Doctor ~~to~~ William F. Scott of Somerset was a sister of William O. Bradley who was Governor of Kentucky in 1895.

I presented this quilt to Mrs. Nunn at the Mansion May 14, 1970 it was most graciously accepted by her. My brother Dick M. Scott and wife had a part in the presentation.

This handwritten letter documents that this quilt was created by Grandmother Scott. She was the wife of Doctor William F. Scott of Somerset Ky and was a sister of William O. Bradley who was the governor of Kentucky in 1895. The Quilt was presented to Mrs. Louis B. Nunn, first lady of Kentucky, and donated to the Whitehall Hall St Shrine, Home of Cassius Clay, in 1970.

Note how the history of Grandmother Scott and her quilt, is traced through her male connections?



This is a close up of the crazy quilt with a name and date sewn on to the quilt.

Work was an everyday reality but there were times of celebration with dancing, singing, and playing music on fiddles, pipes, accordions, and other instruments. This might happen after families came together to help their neighbors build a barn, harvest a crop, or celebrate a holiday. Children might have had fun playing games, such as Sheep Over the River, Hide and Seek, Pull the Rope, or Steal-Stick-Duck-Stones. They also made their own toys. Such as dolls made from corn cobs and rags. An animal bladder balloon could be used for ball games, and jump ropes were often made from tree vines. See **"A is for Appalachia"** and **"Toys and Games of Appalachia"**, written by Linda Pack and illustrated by Pat Banks. These children's books document and have directions for some of these games and celebrations.

Children and their families typically went to sleep at dusk as not much could be done when the sun went down. Summer days were long but as winter came the days were shorter and the nights were cold and long. While they had candles and lanterns, the materials were expensive and time consuming to make. They did not want to waste these items for leisure time. Besides, they were tired from all the work that day or the long walk back from school, so it felt good to get ready for bed. After a dinner cooked over an open fire, the kids would snuggle into a bed made of soft animal furs on the floor, or on a bed frame laced with rope to hold a mattress filled with corn cobs, feathers, or cattails. The quilts that mother and grandmother made were colorful and warm too. Sometimes, while in bed, the children could hear their parents plan the next day or tell stories as they sat by the fire. Cabins were small so most children shared their bed with one or more brothers and sisters. The stars would come out, the moon would rise, the owl would hoot, and the whippoorwill sang.



Jump Rope



Handmade candles, soap baskets.



Here are a few plants and animals from the Kentucky River Watershed. Choose three animal/insects or critters from the watershed and draw. Paint them and add to your journal. You can sketch from these examples and /or draw your own!



Blood Root and Rabbit
From
Plants of Appalachia.

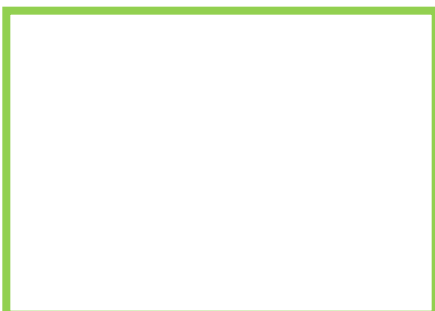


Oak Tree and Opossum
From
Plants of Appalachia.

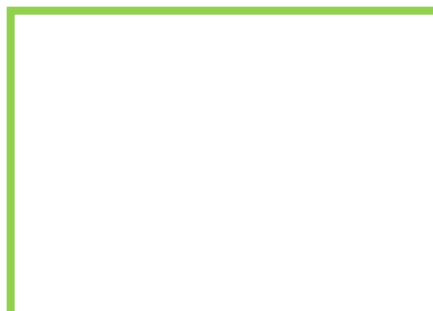


Tulip Poplar and Black Bear
From
Plants of Appalachia.

Your thumbnail sketch



Your thumbnail sketch



Monarch butterfly



End Student Texts

ACTIVITIES:

Choose one or more of these activities to be completed. At teacher discretion, an activity can be assigned to be completed by an entire class, or several students be selected to be assigned to cooperative learning groups, with results being shared with the class. Add as many HANDOUTS and projects to your journals.

- **Pottery, Baskets, Weaving, Blacksmithing, Candle making and Soap making would be a few of the skills and crafts that the settlers brought with them to the settlements. The Kentucky Arts Council has a catalog of teaching artists and crafters that can come to the class-room to demonstrate and teach these arts to students. The KAC also offers grants to cover the cost of the visiting artist!**
- **HANDOUT-** As a class or cooperative learning group read the article: **“Kentucky, Where the Buffalo never Roamed”**, (See RESOURCES section for the article). Discuss what you learned. If you worked as a group, present your findings to the class. The group can also present a chart/ PowerPoint comparing buffalo and bison. Have students share their opinion as to why the expression “Buffalo” continues to linger when the correct name for the animal is Bison. It is important to remember that the Native Americans had their own names for the animal, but the name the Settlers used came from the French word “BOEF” for beef. When the Native Americans used the name “Buffalo” they only copied it when speaking with the Settlers.
- **HANDOUT: Make a crazy quilt** from paper scrapes). **RESOURCES**
- Use the facts presented in this lesson (or the students’ own research from this time period) to write the history of the first settlers up to the time Kentucky became a state, from the standpoint of the Riverkeeper mascot, Eluama. Eluama can come to the riverbank to tell her story from the perspective of living in the river. She might talk about observing settlers and Native peoples engaged in activities on the riverbank. She may have heard stories from animals that live in the watershed. Forest animals might have come to the river to tell her stories about Native people and/or the First Settlers. Make it fun and write in dialogue form.
- **Write/Tell** the story of a day living on the frontier as an adult. Choose your job and/or interests: Basket weaving, candle making, soap making, weaving, hunting, gardening, farming, blacksmithing (working with metals), woodworking (furniture and more) or teacher of a one room schoolhouse. Do your own research for this assignment. You can write this in prose. Add it to your journal. Dress up in costume to present your story.
- **Make a Timeline** of the events presented in this lesson. Add it to your Journal.
- **HANDOUT: Historical Reading** - read the supplied passages from “Daniel Boone- in his own words”. Use the helpful hints supplied to make the reading interesting and engage your listeners. Dress up in character can also add interest.
- **HANDOUT:** Compare and Contrast the statements Daniel Boone made in the historical reading in this chapter with what is found in the article, “Kentucky, the Land where the Buffalo Never Roamed”. As a class or cooperative learning group, have the students read the article and discuss what they learned. Groups present their findings to the class. In addition, the groups could also present a chart/ power point comparing and contrasting buffalo and bison. Have students share their opinions about why the name “buffalo” continues to linger when the correct name for the animal is “Bison. Hint: The French word for “beef” is “boef” and the Native Americans had their own names for the animal (some are included on the handout). When they used the name “buffalo” they just repeated what the settlers said in their language. Have students research the various names tribes have for the bison? Students share their findings with the class.
- **HANDOUT: Write a Poem(s)** Use this chapter and the vocabulary list as a resource. Alliteration, Haiku, Acrostic, Sensory. Rules and examples for these genres are given. **RESOURCES.** Add to your Journal.
- **HANDOUT: Recipe - Burgoo** traditional and modern. Have a taste from the frontier!
- **HANDOUT: Recipe - Daniel Boone’s Spoon Bread.** Daniel Boone’s favorite food was reportedly Spoon Bread. Try to fix this in the classroom to share but if that doesn’t work ask your family if they could help you fix this at home! (Note: Boone Tavern in Berea has this dish on their menu!)

FURTHER ACTIVITIES:

You might plan a class trip, or a family trip, to Fort Boonesborough State Park, Shaker Village, Fort Harrod State Park, Frankfort, and the Salado Center. Many of these destinations are located on or near the Kentucky River.

Actors -Contact the Kentucky Arts Council, they have a roster of actors and musicians that can bring historical figures to life! They can conduct workshops, perform, and teach!

Always consider stewardship activities! What can you do as a class or school that might make a difference in your community? Share the ideas with friends and family and encourage them to participate!

SOURCES:

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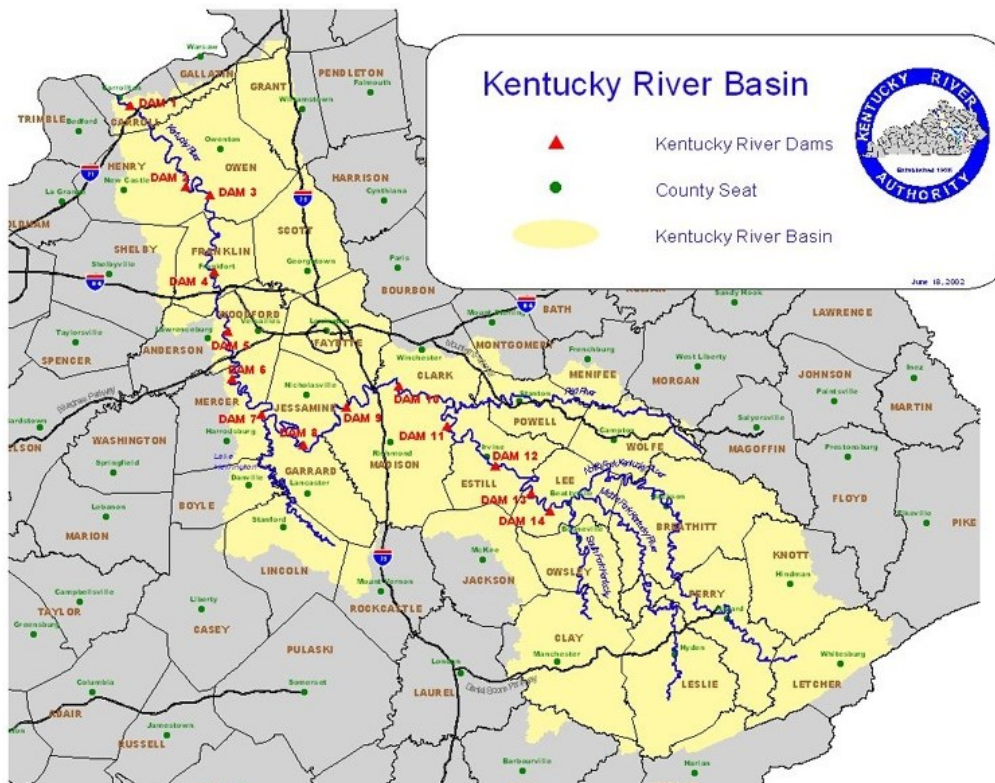
The Kentucky Arts Council: www.artscouncil.ky.gov

<https://www.biography.com/explorer/daniel-boone>

<https://historicmissions.shsmo.org>

<https://kyriverkeeper.org>

Kentucky River Navigation Charts, Kentucky River Authority



7 Water Trail and the Kentucky River

Pat Banks and Roberta Hounshell



Introduction: Pat Banks, Kentucky Riverkeeper

The Kentucky River has been used as a water trail for thousands of years. For many years it was the only pathway to the heart of the Kentucky River Watershed. So much of the land was isolated and hard to travel. There were few trails (usually made by animals like bison) and no roads. The native people made canoes to travel on the river and creeks. The canoe was perfect for the sometimes shallow water. Sometimes the native people would need to portage around blockages on the river, such as fallen trees, rock slides and possible dry areas. The canoe would just be lifted up and portaged (carried) around the obstacle. Think of the Palisades, Red River Gorge (connected to the Kentucky River Water Trail through the Red River) and other lands that were made accessible through the headwaters and all of the little rivers (Elk Horn, Dix, Otter, Beech Fork, Benson, Greasy, Hickman, Lulbegrud, Paint Lick, Silver, and more) that were accessible because of the natural water trails!

The Kentucky River Water Trail is not new but it is time to reimagine it connecting us to our natural world and our communities up and down the river. We can travel the river and all of the special creeks and rivers to, camp under the stars, see animals in the river corridor that we might not see in the cultivated parts of the watershed, like bears, otters, wild cats, eagles, herons, and more. It is possible to put a canoe or kayak, into the river at Whitesburg (north fork) and travel north to Carrollton at the convergence of the Kentucky and Ohio rivers.

Time: 1-2 class periods

Grade: 4-12*

Base content is for grades 4-8, content can be adapted for higher grades by assigning more in-depth research on geology and stewardship projects. Writing activities and poetry assignments could also be adapted for older students.

CORE CONTENT STANDARDS:

UNIT OBJECTIVE: Introduce students to their Kentucky River and the watershed through the lens of the core arts and science while cultivating stewardship and responsibilities

LESSON OBJECTIVE:

Students will be able to:

Describe what a water trail is

Describe the beauty the water trail has to offer

List some rules you should follow to be safe while enjoying activities on the water trail

List some stewardship activities that could be completed to benefit the health and quality of river.

PRE-LESSON ASSESSMENT:

The lesson starts with a brainstorming session for the entire class to determine prior knowledge. Ask :

What are the important features of a Kentucky River water trail?

What is a water trail?

What beautiful things do you think you can observe on and around the river?

What stewardship activities could you do that benefit the river?

How do you get on and off the river?

What fun things could you do on and around the river?

What are ways to stay safe while enjoying activities on the water trail?

Note the answers the class gives in a way that the information is accessible after completion of the lesson so you can compare if student knowledge has increased.

MATERIALS:

Print out of the Governor's Acclamation

Print out of student text

Maps

Chart paper to record answers during pre -assessment brainstorm

3 different color highlighters

Student journal

Poetry Handouts



Maps

Create your own Kentucky River Water Trail map, locate your town, and add your own favorite animals from the Kentucky River Watershed. To make a map for your bulletin board - the basic map on a covered bulletin board. Trace the map then have students choose an animal to study and sketch, (bird, reptile, insect, fish, plants etc....) draw, color, then and/or paint their specimens. Cut each of the student works out and make a collage on the board! Make a video of it and share with the school.

LESSON PROCEDURE:

- **Print out the Governor's Acclamation: See RESOURCES.** Kentucky Governor Andy Beshear issued an Acclamation on April 19, 2022, which states: The Kentucky River is a crucial artery twisting through the Commonwealth. It begins in the mountains of Eastern Kentucky, and flows through the coal-mining regions, the dramatic palisades, parks, iconic Bluegrass horse farms, vineyards, and historical sites, before joining the Ohio River. The river eventually connects to the ocean. It includes about 7,000 square miles with 42 counties in its basin and supplies drinking water to nearly 1,000,000 (one million) Kentuckians. See entire acclamation attached! Provide a copy for each student.
- Teacher: print student text or send to student devices. Ask students to highlight the vocabulary given above as the text is read. Students or teachers can read the text.
- What is a water trail?
- How are the locks and dams used on the water trail?
- What recreational activities does the river offer and how can we participate safely and why do we need to keep the river clean?

Acclamation

by

Andy Beshear
Governor

of the

Commonwealth of Kentucky



To All To Whom These Presents Shall Come:

- WHEREAS, The Kentucky River is a crucial artery twisting through the Commonwealth beginning in the mountains of Eastern Kentucky, flowing onward to the coal-mining regions, the dramatic palisades and the iconic Bluegrass horse farms before joining the Ohio River, which eventually connects to the ocean. It includes about 7,000 square miles with 42 counties in its basin, and supplies drinking water to nearly one million Kentuckians; and
- WHEREAS, The Kentucky River continues to serve as a source of recreation and commerce. For more than a decade, state and local leaders from all across the river watershed have joined forces in support of the Kentucky River Water Trail project—a nationally-recognized effort to grow and promote the 259-mile river way as an interconnected watercourse for recreational activities and outdoor fun; and
- WHEREAS, The Kentucky River Water Trail was selected in 2011 as one of 100 projects across the country to be recognized as President Barack Obama's initiative "America's Great Outdoors" launched to address the growing issue of Americans who are losing connection with outdoor places and the value they provide to the quality of life; and
- WHEREAS, The Kentucky River Water Trail project joined forces with the Kentucky River Authority in 2019 in an effort to focus on all 14 lock and dams along the river as potential community parks and portages; and
- WHEREAS, The Kentucky River Water Trail connecting waterways serve as educational and discovery opportunities, and provide scenic recreational flat-water activities that have been relatively untapped including the limestone palisades, steep gorges and cliffs. With the addition of river access points and recreational amenities, local communities can encourage visitors to spend time by or on the river; and
- WHEREAS, The Kentucky River Water Trail project remains a priority for the Kentucky Riverkeeper, a non-profit organization dedicated to preserving the river and the communities that depend on it;

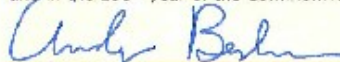
NOW, THEREFORE, I, ANDY BESHEAR, Governor of the Commonwealth of Kentucky, do hereby pay tribute to

KENTUCKY RIVER WATER TRAIL PROJECT

for its effort to promote and protect the river for generations to use and enjoy.



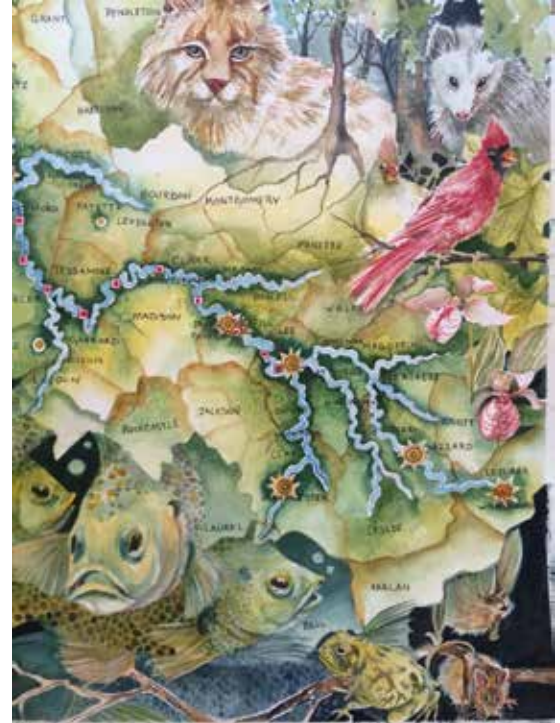
DONE AT THE CAPITOL, in the City of Frankfort the 19th day of April, in the year of Our Lord Two Thousand Twenty-Two and in the 230th year of the Commonwealth.


ANDY BESHEAR
GOVERNOR

Student Text

VOCABULARY:

- **Water trail** - A water trail consists of marked routes on navigable water-ways such as rivers, lakes, canals, and coastlines for recreational use of small boats. These include kayaks, canoes, single sailboats, or rowboats and sometimes motorized vessels.
- **Acclamation** - Loud and enthusiastic approval, typically to welcome or honor someone or something. See the governor's acclamation for the water trail.
- **Ecosystem** - A biological community of interacting organisms and their physical environment.
- **Habitat** - resources, physical, and biotic, factors that are present in an area, such as to support the survival and reproduction of a particular species.
- **Palisade** - A line of bold cliffs.
- **Riverbank** - The land on each bank of a river.
- **Lock and dams** - The purpose is to create a series of slack water pools. This allows river vessels, to rise or descend, to the next water level, as they travel upstream or downstream.
- **Wetlands** - Lands consisting of marshes, swamps, or saturated lands.
- **To ply the river** - To travel regularly on the river (phrase or expression). **Portage** - To carry a boat around obstacles and/or between navigable water.



What is a Water Trail?

A water trail consists of marked routes on navigable waterways such as rivers, lakes, canals, and coastlines. Small boats like kayaks, canoes, single sailboats or rowboats, and sometimes motorized vessels are used recreationally on the water trail. A water trail is to the water, what a hiking trail is to land.

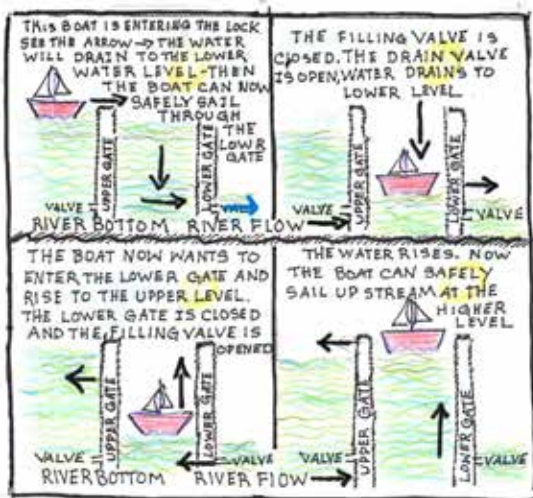
The Kentucky River Water Trail is described by Kentucky Ecotourism as one of the most beautiful scenic routes, comparable to Arizona's Grand Canyon and Europe's Rhine River. In this chapter, the beauty and diversity of this river is highlighted. The trail is growing organically one county, lock portage, park, and community at a time. The river connects us to each other and is a spiritual and physical connection to the natural world. Please note that the mythical, magical Eluama has a birds eye view of the Kentucky River and all of the diversity. The Kentucky River provides drinking water to over 1,000,000 (one million) people.

Pat Banks, the Kentucky RiverKeeper, explains, "The river is the trail. We don't have to build it, it is already there. The Kentucky River has been used as a water trail for thousands of years! Many people now don't realize that there is a river and that it can be/ is a tremendous resource. The water trail can be re imagined and re-connect our communities through our common history and cultural heritage, make education about the importance of clean water, eco development, stewardship, preservation/restoration of the riparian zones, and the connection to healthy communities up and down the river, make sense. When people have access to the river, when they can boat, fish, kayak, swim, camp, travel, photograph, paint and pic-nic on the river, and experience the beauty and the power of the river, then they care. It is possible to travel from Whitesburg through Beattyville and all the way to the Ohio River by kayak and canoe. There are challenges. We are working to create more access points, and more portages and parks to make the journey easier. There are other designated water trails in other states. We are using them as a model and for inspiration."

To understand the Kentucky River Water Trail a brief overview of the lock and dam system is important, see as follows.

The Kentucky River Water Trail emerged from the Kentucky River Lock and Dam System under the umbrella of the Kentucky River Authority. When referring to William Grier's book, "The Five Lives of the Kentucky River" many advocates and stewards of the river consider the water trail to be the "sixth" life of the Kentucky River! You will learn more about detailed information about locks and dams in the next chapter, but for now we learn that locks and dams were created to control the flow of water and make the river navigable most of the year. The first lock (#1) was built in 1822-42 and the last one (#14) was built in 1911-17. Flat boats, barges, and riverboats plied the Kentucky River carrying out timber, coal, tobacco, salt, and other resources from the headwaters in eastern Kentucky to Carrolton then to the ports of Cincinnati, Louisville and ultimately New Orleans. Why did we need locks and dams? The wild, untamed river was shallow, and it could not be commercially navigated much of the year. It was unpredictable to try to navigate the "tides" (spring floods) in season. The lock and dams provided a solution. A lock is a chamber big enough for a boat. It has gates at each end. The river above the lock and dam is higher than the river below the lock and dam. The lock is the way you can lower or raise the boat to the right level. It allows the boat to navigate from one level (pool) to the other.

How does a lock work? When a boat is going downstream it enters the lock chamber, then the chamber is filled with water when the valve is opened. Pascal's Law states, that water in a closed system will seek to find its same height throughout. So, when the filling valves are opened, the lock chamber quickly fills with water until it reaches the same level as the river upstream of the lock. At that point, the upstream gate is opened, and the boat moves into it. To lower the boat, the gates are closed behind it, the filling valve is closed, and the drain valve is opened. The higher water in the lock chamber drains to the downstream level within a few minutes. The downstream gate is then opened, and the boat moves out of the lock chamber onto the lower water level. Some of the locks on the Kentucky river have small hydroelectric plants in them that produce green energy for people in their communities.



Sketch this simple illustration of the lock system. Think about Pascal's law that explains the process.

**Pascal's Law states,
that water in a closed system will
seek to find its same height
throughout.**

This Kentucky River Water Trail is an organic project and is growing every year. The water trail is an interconnected water-course for recreational activities and outdoor enjoyment. The fourteen lock and dam properties provide portages around the locks, additional parks, ramps, camping, and parking. The water trail is **the river** as it flows from the mountainous region of southeastern Kentucky into the central Bluegrass Region and eventually into the Ohio River in north central Kentucky. Towns and cities along the way such as: Whitesburg, Hazard, Manchester, Beattyville, Ravenna, Irvin, Frankfort, Gratz and Carrolton. Some of the parks and preserves and Heritage Land corridors along the river include, Natural Bridge, Boonesborough, Lower Howards Creek, Ravens Run, Shaker Village, General Butler.

Activity: at this point watch the drone Video by Ben Childers (1 minute 54 seconds). Discuss what you saw in the Video: High Bridge (lock #7), Old Camp Nelson Bridge, Palisades, and Clay’s Ferry Bridge. Locate and mark on the river map place that you observed.

The Kentucky River Water Trail serves as a ribbon of discovery, creates educational opportunities, promotes a healthy environment and high quality of life, while preserving our natural, cultural, and historic heritage. Some of that heritage involves the native people who lived, cultivated gardens, built villages, traveled, and hunted this bountiful woodland for over 12,000 years. The first settlers followed a dream to come to the new world, claim the land, and discover the vast resources, (fur, timber, tobacco, coal and more.) The river was the corridor for travel, trade, and settlements.

The Kentucky River begins at the headwaters of the North Fork, the Middle Fork and the South Fork then converges at Beattyville to form the mainstem. The 240-mile route provides a variety of scenic flat-water recreational opportunities that have been relatively untapped as a recreational resource. Tantalizing among the scenic vistas is the 100 mile stretch of limestone palisades, gorges, and cliffs. This is a wonderful wildlife corridor and refuge. Eagles, herons, and buzzards have nests and rookeries. Bats find sanctuary in the cliff faces. There are unique ecosystems throughout the river system. Biologist, William S. Bryant said, “There is nothing else like it. This is probably the most unique part of Kentucky.” Yellowwood (gopherwood) is a relic of the past Tertiary period, 65 million years ago! The terrain is rugged, and modern development at the river edge is minimal! It is a critical habitat for our endangered species and wildlife. It is possible to travel for hours and be lost in the natural world! The early morning mist is a magical time for photography! The stillness of the Kentucky River lets travelers see the wildlife going about its business. This also provides opportunities for travelers to take photographs or stop at a shaded beach, or shoal, to sketch and to fish, and pic-nic. John James Audubon, the famous naturalist and painter, traveled this same river corridor with Daniel Boone. (Some historians dispute John James Audubon’s recollection.)

Stewardship

Stewardship of the water trail is critical! Always take out more garbage than you pack in! Think of our native history and heritage and protect and practice “doing no harm” on your journey. Let that practice inform your stewardship, even when you are off the water. Remember, what happens on the land affects the water as well!



Eluama's Birdseye view of the Kentucky River

Eluama means beautiful water in some native languages. let's take a tour of the river. We board on Eluama's back. She is quite big, so we have plenty of room. Since she is magical it will only take us a few minutes to travel the trail. But if we were going to take a canoe or kayak it might take us three or four days to travel the 240 miles from Beattyville to Carrolton! And that doesn't count the headwaters! There is a North Fork (155 miles), Middle Fork(93 miles) and a South Fork(77 miles) that merges at Beattyville to become the main stem of the Kentucky River!

The first thing we will see when we fly over Beattyville will be the area where the headwaters con-merge to form the main stem of the river. We will travel north past palisades, beaches, forests, creeks, and farms. We will see the portages around the 14 lock and dam proper-ties. (Some portages are still under construction.) Some of the locks contain hydroelectric plants to make clean electricity for thousands of Kentuckians. The lock and dams were built for river commerce (flat boats, paddle boats and river boats). Now they hold water back to create pools for our drinking water. Eluama loves the parks to stop and picnic or camp. We can see deer watching us from the riverbanks, raccoons washing their dinner at the water's edge, eagles and blue herons nesting in towering tree branch-es. At dusk we see bats emerge from the sheltering caves and rock crevices. Other won-derful creatures are going about their business as we fly by. They all recognize our flying water serpent and feel safe! We pass Irvine & Ravenna, Fort Boonesborough, and the Pali-sades area of limestone cliffs stretching 100 miles north. We can see the vibrant colors of the wildflowers which grow so well there, due to the limestone. We recognize a variety of trees; abundant blue ash, chinquapin oak, and sugar maple. In addition, we see some yellow buckeye, and yellowwood rock elms on the steep limestone slopes. There are some trees that Eluama does not recognize. These are some uncommon tree species to be found in the Palisades (Paxistima, Chokecherry, Viburnums). We pass by Shaker Village and see a boat loading up at Shaker Landing for a trip on the river. People will enjoy traveling by the steep scenic gorges and seeing the rocks in sedimentary layers. As we pass by Frank-fort, we can see some high steeples and we recognize the Capitol from the air. That is where the governor has his official place of work. We see River View Park in the heart of downtown Frankfort. It has a picnic area, a fishing pier, walking trails and a pavilion. Eluama wants to swoop down as she loves picnics and parks, but she must continue her travels for now. We fly over Gratz and then Carrolton! Look at the map! We have been traveling north. The Kentucky River flows past Carrolton and then into the Ohio River. We could keep going, the Ohio River flows into the Mississippi and then into the Gulf of Mexi-co! But that would be another adventure.



Follow the boat safety guidelines when you enjoy recreational activities on the river!! We encourage the buddy system!

CANOE AND KAYAK PADDLING SAFETY

Kayaking and canoeing are popular outdoor recreational activities in Kentucky, the U.S. and across the globe. It is even more important to ensure that proper safety equipment and rules are being observed. Even in the calmest of waters, there is potential for danger to arise, and being prepared can mean the difference between a fun, memorable experience, and a very bad day on the water!

- Get paddle sport instruction.
- Obtain certified first aid and rescue training and carry first aid and rescue equipment.
- Always wear a nationally approved personal flotation device
- Always wear a helmet where appropriate.
- Dress appropriately for weather conditions; cold water and/or cold weather can result in hypothermia. Check your equipment prior to each use for signs of wear or failure.
- Do not paddle in flood conditions.
- Be aware of appropriate river water levels, tidal changes, dangerous currents, and weather changes.
- Scout unfamiliar waters; portage where appropriate.
- Do not exceed your paddling ability; be honest with yourself.
- Follow the manufacturer's recommendations for the use and limitations of their products.
- Look for signs about the dams, portages, and other relevant information while on the river!

Always take out (garbage/trash) more than you take in.

Be a good citizen and have a great day!!

End Student Text



POST LESSON ASSESSMENT:

Use your notes from the preassessment to answer the questions from the brainstorm.

What are the important features of a KY River water trail? (beauty of nature, access on and off the water with opportunities for recreation, like places for a picnic and camping and how do locks and dams figure into the water trail)

1. Beauty of nature: the ecosystem, variety of habitats (riverbank, forest , wetlands, and the many animals living in those habitats geological features (Palisades)
2. Recreation: fishing, boating, enjoying the scenery and how to be safe when doing the activities
3. Stewardship: what can you do while enjoying activities on the water trail?
4. Student will add a short entry for 1, 2, 3 to their journals.

Suggestions for further Activities:

- **Student Text**
- **Study the Kentucky River basin map.** Locate the Towns on the river and put a star in them.
- **HANDOUT** the Governor's Acclamation. **RESOURCES.**
- **HANDOUT:** MAP, where do your students live? Where have they traveled? Find the place(s) on the map. **RESOURCES.**
- **Local Lore-** Ask a local fisherman to talk to your class about fishing and traveling on the river! (Grandparent?) Kentucky Fish and Wildlife can be a resource. Record their story and add to your journal.
- **Water safety Rules-**In your journal, copy and record the water safety rules for riding in a canoe kayak or boat on the river.
- **Have each student read about/study a different area or pool of the Kentucky River** ,The Kentucky River is rich in cultural and natural history. **It has been a Water Trail for over 12000 years!** Native Americans lived and hunted here for thousands of years. Much of early Kentucky history follows the Kentucky river and her tributaries. T
- **HANDOUT the Kentucky River Water Trail Map. (artist rendering)** The river is lined with palisades and is home to endangered species and plants. See the artist rendering of the Kentucky River Water Trail. Use the Kentucky River Watershed Map to create your own version. Add the lock and dams. Locate where you live? What animals (fish, bats, birds etc..) do you want to add to your map? Add to your Journal. If you want to go larger like for a bulletin board, project the map as large as you need . Trace it and have students draw paint or use markers to create their version of the illustrated Kentucky River water trail Map!
- **Stewardship-**As with any trail it is always good manners and good stewardship to take out (garbage)more than you bring in!
- **HANDOUT: Puzzle,** complete the puzzle showing some of the flora and fauna in the watershed by artist Pat Banks.
- **WATER TESTING:** Conduct testing on water from different sources around your school and from home. Inexpensive water testing kits can be found at Walmart, Target, pet stores, online. The Kentucky River Authority, the Kentucky Riverkeeper, and the Kentucky River Watershed Watch are resources for educating students about water testing and operation of the lock and dams. They may have a staff person or volunteer that could come to your class.
- **HANDOUT MAP -DRAW:** Students draw or trace a map of the Kentucky River or (use the HANDOUT of the provided map as a guide. Find and mark YOUR location and that of major cities. Students can add in animals and plants from the Kentucky River watershed habitat (you may use the print of the water trail by Pat Banks, Kentucky watercolor artist as guide), but select your own favorite animals from the Kentucky River watershed).
- **FAMILY FIELD TRIP:** Students ask their families to take a fieldtrip to Shakertown and take a riverboat ride from Shaker Landing. The students report their experience to the class.
- **FAMILY FIELD TRIP:** Ask your family to take a field trip to Fort Boonesborough which is located on the water trail. Students report experiences to the class. Students can include observations/descriptions for the chapter about the First Settlers in Kentucky.
- **HANDOUT:** Recipes: "Water Trail Mix" & Wild Edible Salad.

A Field trip is a great way to connect with your river.

- A trip to one of our Rivertown's and/or parks can give your class access to the river along with local histories.
- These communities are located close to or on the river. They are in various stages of becoming official Trail Towns or communities: Beattyville, Irvine/ Ravenna, Boonesborough, Shakertown, Frankfort, Gratz, Carrollton. You can contact their local tourism office and find out about river access.
- Shaker Town has a riverboat that is used for education rides on the river.
- Frankfort KY has a floating Classroom.
- Visit the Salato Center in Frankfort KY to see local animals and plants.

Materials and Resources:

Kentucky Adventure Tourism,

www.kentuckytourism.com Kentucky Native Heritage Council, heritage.ky.gov

KentuckyRiverkeeper@gmail.com

KY River Water Trail Alliance

KY Fish and Wildlife, <https://fw.ky.gov>

National Park Service, nps.gov

Kentucky River Authority, Navigational Charts, <https://finance.ky.gov>

Kentucky Historical Society, history.ky.gov

Kentucky Geological Society, <http://www.uky.edu> GSK Kentucky Arts Council, <http://artscouncil.ky.gov>

**Always take out
more
(garbage/trash)
than you take in.
Be a good citizen
and have a great
day!!
Stewardship!**

The Kentucky River Water Trail



KRWTA a project of the Kentucky Riverkeeper, www.kyriverkeeper.com



8. The Water Cycle

Pat Banks and Roberta Hounshell



Grade: 3-8 Time: 1-2 periods plus additional time depending on which activities are chosen.

Unit Objective: Discover the Kentucky River Watershed through History, Science, Art, Culture, Conservation, Recreation, and education while cultivating an understanding of stewardship

The Water Cycle is an important component of the study of the Kentucky River Watershed. We explain the Kentucky River is connected to us, as we are shaped by water, our local creek and river then to the larger world. The connectivity is how we can help students relate to their river and practice good stewardship.

“A bay is a noun only if the water is dead.

When bay is a noun, it is defined by humans, trapped between it’s shores and contained by the word. But the verb wiikwegamaa, to “be” a bay releases the water from bondage and lets it live.....

Braiding Sweetgrass, Robin Wall Kimmerer



Lesson Objective:

Students will be able to list and describe the basic steps in the water cycle in their journals (older students can get more detailed with the sub processes in the collection step).

Students will be able to demonstrate the steps in the water cycle in a drawing (older students elaborate on the sub-processes in the collection step: percolation, infiltration, interception, transpiration, runoff, storage).

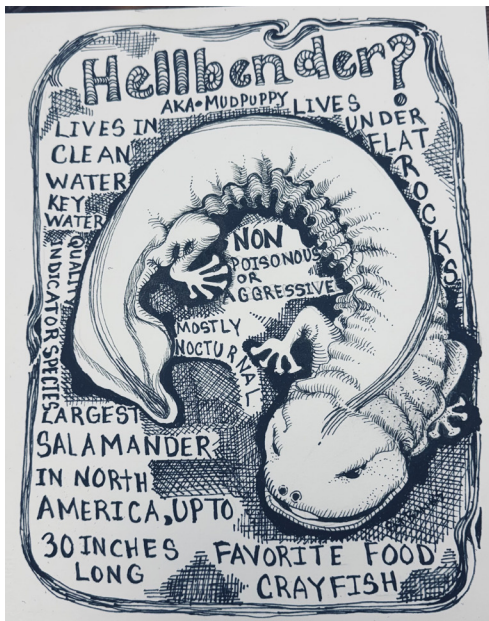
Students will be able to define the terms “gift” and “responsibility” regarding taking care of our earth and list several stewardship activities. Students will be able to explain how the stories of “Skywoman” (copies available in the **RESOURCES** section and included with the text in this lesson) fits into this context.

Students will be able to explain that the water cycle is not just a small-scale process, and the water cycle impacts all water in the world. Therefore, local pollution can have large-scale impact.

Students will be able to explain that there is no new freshwater

On earth freshwater is recycled over millions of years.

We are Shaped by Water,
detail , watercolor, Pat Banks



Materials:

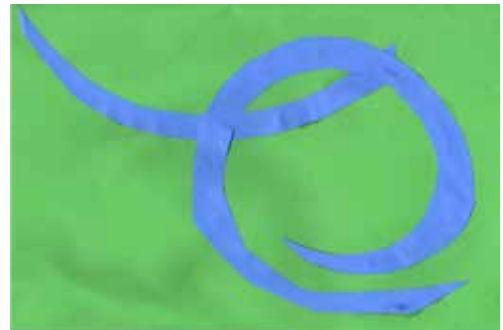
- Student text (printed or sent to student devices)
- Print copy of “Kentucky River Water Cycle” simple or more advanced from **RESOURCES** section
- Coloring pencil/markers/crayons
- Highlighters (for students to mark vocabulary and specified information in text as they read or listen)
- Journal
- Poem– see hand out in **RESOURCES**

Materials are for ACTIVITIES listed below the Student Text. If there are handouts for the activities, they will be referred to in the description of the activities, and they can be found as indicated in the **RESOURCES** section.

Lesson Procedure:

Background: Students usually learn about the water cycle in the early grades. So why is it included in this curriculum? As stated earlier, there is no new freshwater on earth. Water keeps moving through the steps of evaporation, condensation, precipitation, and collection in the water cycle. We want students to realize that pollution affecting the river does not have to occur directly near the river. Any action connected to pollution in the watershed has an impact on the river. Our actions impact others and their resources, and the actions of others impact us and our local resources. Trash washing into the sewer system, anywhere in the watershed, impacts the river. We want students to think in a local and global perspective.

Teacher conducts a brainstorm session of student knowledge of the water cycle and the vocabulary in this lesson. Students might be familiar with the four basic steps of the water cycle but not the subprocesses in the “collection” step. Teachers determine the depth of knowledge for their student groups.



Pre- lesson assessment

1. The teacher conducts a brainstorm activity asking about the following:

- What do you know about the water cycle? How many steps are there?
- Between the steps, how much area is covered between evaporation and rainfall?
- What is a “gift” and what is “responsibility”? How could this be related to the water cycle or to stewardship?
- How much freshwater do we get on earth a day, a month, a year????
- Where does this fresh water come from?
- How does pollution figure into the water cycle process?
- Are we part of the cycle?

Teacher keeps the answers on chart paper, or in some format where the answers can be accessed as part of the post lesson assessment.

2. Hand out Student Text in print or send to student devices. Read the text as a class, or the teacher reads it out loud, depending on the group of students.

3. Discuss the quotes by Wendall Berry and Robin Wall Kimmerer. Read Quote 1 and 2 out loud:

Quote 1: Wendell Berry

“The atmosphere, the earth, the water, and the water cycle - those things are good gifts. The ecosystems, the ecosphere, those are good gifts. We have to regard them as gifts because we couldn’t make them. We have to regard them as good gifts because we couldn’t live without them.”

- Why is everything mentioned, in this quote, referred to as “gifts”?
- Why do you think Mr. Berry says we have to “regard” them?
- What does he mean? How can we do this?

• **Quote 2: Robin Wall Kimmerer “Children hearing the “Skywoman” story from birth know in their bones the responsibility that flows between humans and the earth.”**

4. Sky woman-The class needs to read the story first. The teacher, or a student, can read it aloud. The story is

included just before the quotes in the STUDENT TEXT and in this teacher text. We have multiple version of this beloved story.

NOTE: This is the Haudenosaunee version. The Haudenosaunee are an Iroquoian-speaking confederacy of First Native peoples in northeast North America/Turtle Island. They were known as the Iroquois League during the colonial age and later as the Iroquois Confederacy (Wikipedia). They believe the earth was created through the interplay of elements from the sky and waters. The different Iroquoian-speaking peoples tell slightly different versions of the creation story, which begins with Skywoman fall-ing from the sky.



“The Story of Skywoman” (Origin Story)

Long before the world was created, there was an island inhabited by sky people. One day a pregnant sky woman drops through a hole created by an uprooted tree and begins to fall for what seemed like an eternity.

Coming out of darkness, she eventually sees oceans, The animals from this world congregate, trying to understand what they see in the sky. A flock of birds is sent to help her. The birds catch her and guide her gently down onto the back of Great Turtle. The water animals like otters and beaver have prepared a place for her on turtle’s back. They bring mud from the bottom of the ocean and place it on turtle’s back until solid earth begins to form and increase in size. Turtle’s back becomes Skywoman’s home and the plants she has brought down with her from Skyworld, including tobacco and strawberries, are her medicine. She makes a life for herself and becomes the mother of Native American life.

5. DISCUSSION of the Skywoman Story:

The teacher discusses with students how SKYWOMAN brought all the resources with her from the sky. With the help of the others, she plants everything in her new home. The earth and nature became everyone’s responsibility to take care of! Many Native Children have grown up with this story and continually learn they must be responsible with earth’s resources. Every child who has heard these stories over and over will know these thoroughly, “in their bones.”

What is a gift and what is a responsibility? How do the terms apply to our natural resources? Discuss, with the class, what the authors Kimmerer and Berry mean in their quotes (student text) regarding “gift” and “responsibility”. Have students put answers into their own words as a journal entry OR the teacher can take notes on the board or formulate a short answer/ definition for both terms (from the student discussion) and students can copy into their journals.



6. Read the rest of the student text - the students or the teacher reads out loud. Provide text in printed form or electronic form. Ask students to highlight the steps in the water cycle, vocabulary, and other information needed to answer the questions below:

Discuss the following comprehension questions:

- What are the steps in the water cycle? (Older students need to go more into detail with the processes in the “collection” step). Students complete the Handout: “The Kentucky River Water Cycle” which can be found in the **RESOURCES** section.
- How do the terms “gift” and “responsibility” relate to taking care of our earth? What are some stewardship activities? Make a list.
- How does the story of Skywoman fit into this context?
- How do we get new freshwater on earth? **Is this a trick question?? Since there is no new freshwater.** How does the water cycle have a local impact as well as a larger, potentially global impact? All freshwater is already on earth. Water is locked up in glaciers, icecaps, permafrost, or buried deep in the ground. Only, roughly, 1 % can be used as drinking water which mostly comes from rivers and streams. **Remember:** there is no “new” freshwater on earth it is recycled and recycled.

The TEACHER MAKES THE POINT THAT THE SAME FRESH WATER HAS BEEN USED AND REUSED FOR MILLIONS OF YEARS!!!!

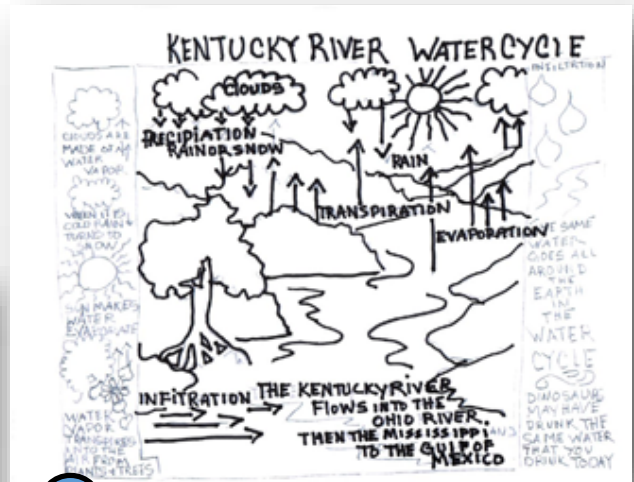
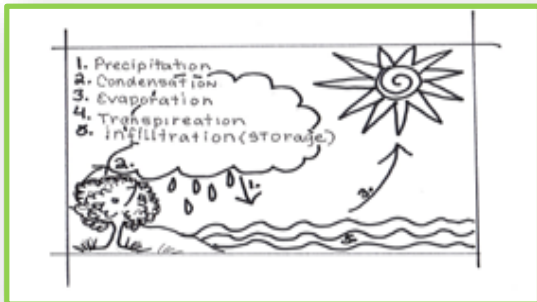
Pollution occurring any-where in the watershed impacts the river and ultimately all water. Over a million people get their drinking water from the Kentucky River. How does the water cycle affect large areas, even the whole world? You may remember that volcanic eruptions can affect large areas of the world? Storms, hurricanes, tornadoes, and typhoons can have global impacts. Large scale industrial pollution can have long-range impacts. Water is affected by all of these and pollution can spread as it cycles around the world.

7. The teacher determines if and what further activities will be completed.

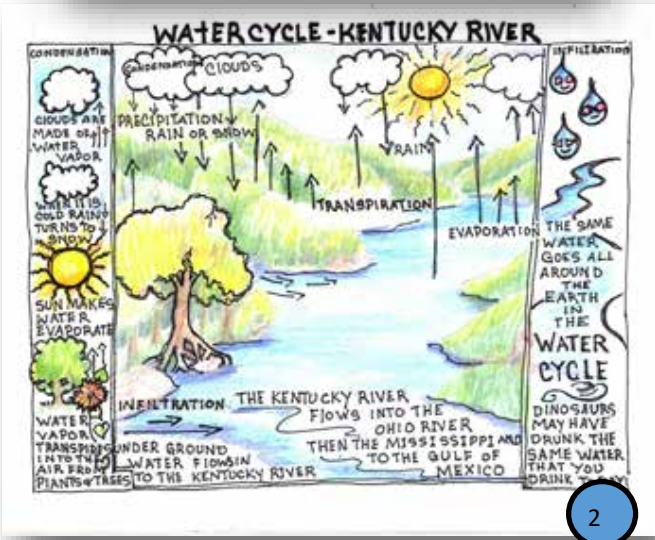
Extra activities can be assigned to cooperative learning groups with outcomes being shared with the class upon completion.

NOTE: The scale and depth of the post lesson assessment is based on teacher discretion. It is based on student need and ability. The teacher has a post lesson discussion with the class. The facts gathered during the brainstorm activity in the pre-assessment will be compared to post-lesson knowledge to determine what new learning has occurred.

- Have students articulate that all pollution affects the water cycle. All the freshwater on earth is already here!! We MUST learn to manage our resources responsibly.,
- Have students close their eyes and imagine the water cycle. Have students list at least the 4 basic steps of the water cycle in a sketch in their journals. The teacher determines if their students elaborate on the subprocesses in the collection step: percolation, infiltration, interception, transpiration, runoff, storage, or just the 4 basic steps).
- Students color and label the Kentucky River Water Cycle handout (see **RESOURCES** section) and glue it into their journals.
- All students list at least two stewardship activities they think they could complete at home, in the school and in the community. Outline these activities in their journal. Share with the class and maybe vote on an action the whole class can promote?
- Define “gift” and “responsibility” as it relates to handling our natural resources (definitions given in the vocabulary section). Students explain that Skywoman brought her gifts to earth and started the way of life embraced by Native Americans. We have learned in earlier chapters that Native Americans respected the earth’s natural resources by handling them responsibly and felt a connection to the earth. At teacher discretion, a short summary, about Skywoman, can be a class activity or can be assigned as a written, independent activity.
- Additional activities can be completed at teacher discretion and students can enter evidence of the completed activity in their journals (choose from the list of **ACTIVITIES** below the Student Text).



1



2

The drawing of the water cycle is important to visualize the process. The example show the process. 1. draw and make notes on the side then , 2. add more details and color.

The Kentucky River Water Cycle

Vocabulary

Gift: A thing given willingly to someone without payment; a present. (in Native American culture, and in nature, gifts may come with responsibilities.)

Responsibility: The state of having a duty to deal with something or having control over someone.

Water cycle: The cycle of processes by which water circulates between the earth's oceans, atmosphere, and land, this involves precipitation as rain and snow, drainage in streams and rivers, and return to the atmosphere by evaporation and transpiration (Oxford Languages definition).

Hydrology: The study of the water cycle.

Steps in the water cycle (see defined below in the text).

SKY WOMAN (Origin Story)

NOTE:

This is the Haudenosaunee version. The Haudenosaunee are an Iroquoian-speaking confederacy of First Native peoples in northeast North America/Turtle Island. They were known as the Iroquois League during the colonial age and later as the Iroquois Confederacy (Wikipedia). They believe the earth was created through the interplay of elements from the sky and waters. The different Iroquoian-speaking peoples tell slightly different versions of the creation story, which begins with Skywoman falling from the sky. **There is another version as told By Susan Mullins in the RESOURCE section.**

Long before the world was created, there was an island inhabited by sky people. One day a pregnant sky woman drops through a hole created by an uprooted tree and begins to fall for what seems like an eternity.

Coming out of darkness, she eventually sees oceans, The animals from this world congregate, trying to understand what they see in the sky. A flock of birds is sent to help her. The birds catch her and guide her gently down onto the back of Great Turtle. The water animals like otter and beaver have prepared a place for her on turtle's back. They bring mud from the bottom of the ocean and place it on turtle's back until solid earth begins to form and increase in size.

Turtle's back becomes Sky Woman's home and the plants she has brought down with her from Sky-world, including tobacco and strawberries, are her medicine. She makes a life for herself and becomes the mother of Haudenosaunee (native) life, as we know it today.

QUOTES:

Quote 1: Wendell Berry - "The atmosphere, the earth, the water, and the water cycle-those things are good gifts. The ecosystems, the ecosphere, those are good gifts. We have to regard them as gifts because we couldn't make them. We have to regard them as good gifts because we couldn't live without them."

Quote 2: Robin Wall Kimmerer - "Children hearing the "Skywoman" story from birth know in their bones the responsibility that flows between humans and the earth."

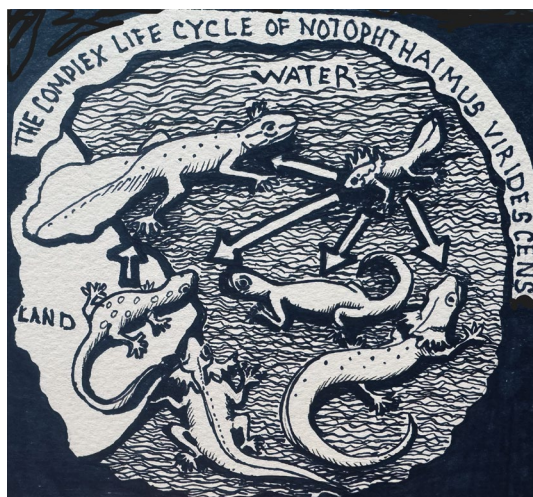


Thoughts on The Water Cycle, by Mary Hufford, PhD

Water cycling through land and air, interacts with the life cycles of many creatures, including humans. Humans celebrate cycles of life and the seasons through interactions with water. Old Regular Baptist congregations in Eastern Kentucky still practice baptisms in the river, believing that living water best represents the beginning of spiritual life. The Cherokee observed a practice of “going to water” for cleansing and renewal. Miners’ vacations were traditionally a time to camp and fish on the river with their families for a week or more.

Water is dynamic and always changing its state and location. Because of constant changes in water we carry umbrellas, turn on windshield wipers, go tubing or whitewater rafting in the summer, skiing and sledding in the winter, and get lost in the fog. Water condenses into fog, rises as mist in the morning, makes our breath visible in a cold snap, crunches beneath our feet as needle ice, or causes us to gasp at the beauty of rime ice coating the trees on a distant ridge. Snow can break tree limbs, hail can break windows, flooding can destroy neighborhoods and towns, and water following air currents from downstream to the headwaters can carry pollutants back upstream. Taking care of the complex systems that over time have come to hold land and water in their places is crucial.

The relationships between land and water are vital for many creatures that need time in both land and water to complete their life cycles. Amphibians offer a great example of how the headwaters of the Kentucky River are especially well-suited to the needs of amphibious creatures, including turtles, frogs, snakes, salamanders, and more. Salamanders are a particular gift of the Appalachian plateaus, not only to the region, but to the world. Of 816 species of salamanders found worldwide, 138 are found in the Eastern United States, many of them in the Appalachian mountains. There are at least 77 species found across KY, TN, WV, VA, NC, OH, PA. These small, secretive creatures come in many colors: vibrant green, blazing orange, flashing yellow, flaming red, and muted brown or black. They may be spotted, striped, marbled or plain. You will rarely see them, but they play a tremendous role in aquatic and terrestrial food webs, converting small creatures of the soil into protein that feeds many animals above them in the food chain. They’ve been around since well before dinosaurs walked the earth, and they have developed surprising strategies for survival. Some can activate their hind ends to distract predators who then grab them by the tail. Leaving their tail in the mouth of a disappointed predator, these tiny tricksters then escape to grow new tails.



There are **FOUR BASIC STEPS** in the water cycle, evaporation, condensation, precipitation, and collection. Here are a few more details!

1. **EVAPORATION:** The heat of the sun, air temperature, vapor pressure, wind, and atmospheric pressure help transfer water from a liquid state to a gaseous stage. This can happen by natural forces or by human activities, such as water evaporating off heated buildings. Evaporation can happen with a single drop, off seas, lakes, rivers, and oceans. Water can also evaporate from the surface of plants, soil, rocks, and snow. In this way, evaporation lifts water into the atmosphere.

2. **CONDENSATION:** The next step occurs when the vapor in the air cools down and condenses back into a liquid: Clouds, dew, or fog is formed. Clouds also contain sea salt, atmospheric ions caused by lightning, and nitrous and sulfurous acids.

3. **PRECIPITATION:** When water particles fall from the atmosphere to the ground, we have precipitation. As water drops fall, they are exposed to gravity and friction which causes turbulence. This causes smaller drops to fall faster. If ice forms in a cloud high up in the atmosphere and water passes through, ice crystals can form on the water droplets and grow. In this case, snow or ice pellets come to the ground, unless they pass through warmer air on the way down. Pollutants can be transported by the water cycle through precipitation, ending up on land and in water where it falls.

4. **COLLECTION:** After precipitation occurs, all the water is collected in oceans, ponds, rivers, lakes, streams, glaciers, and ground. The following are more details of the collection process.

Interception: When precipitation first falls on leaves, and other vegetation, it collects on the surface, then runs off and falls onto the ground. Snow and ice keep the precipitation on the leaves, instead of allowing the moisture to go into the ground. Wind and the severity with which rain/snow falls has an impact on the water flow. This interruption of the water flow is called interception.

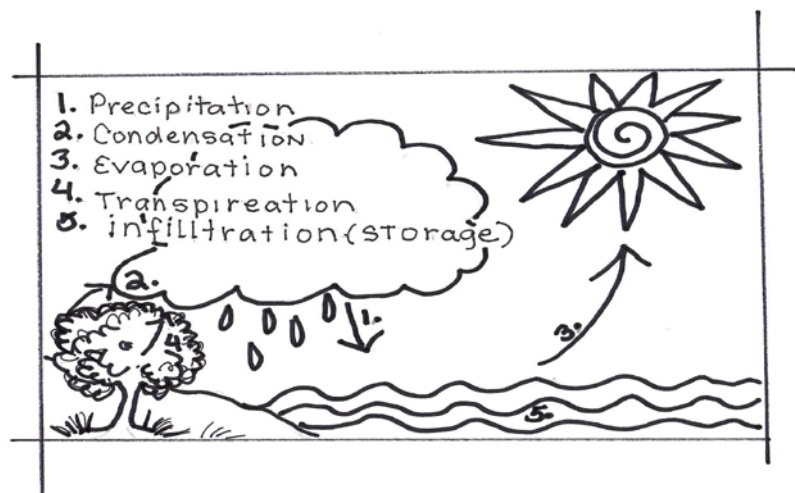
Infiltration: Soil has different texture, structure, and density. Based on the soil profile, different amounts of water can pass through the soil and be absorbed. An example would be how much water can pass through and be absorbed by a sponge. Soil conditions can even change as water moves into deeper layers of the same soil. For example, if the soil is already wet and a heavy rain happens, water might puddle on top of the soil and not, immediately, be able to pass through the soil nor be stored in it. This water might become part of the evaporation cycle or become surface runoff.

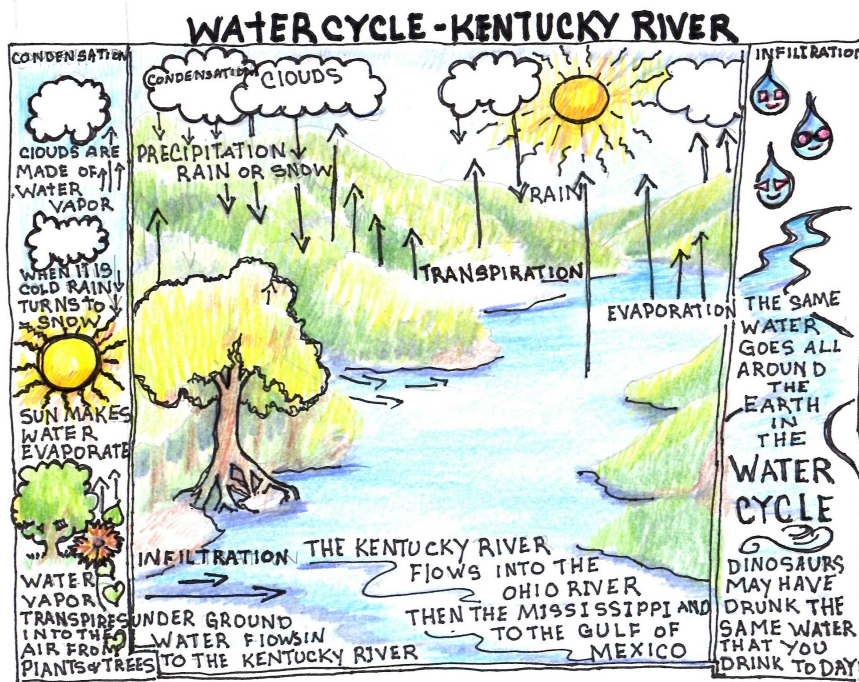
Percolation: This refers to the movement of water through the soil itself. As water moves (percolates) into the deeper layers of the soil, it finally reaches water below the surface of the ground. This is referred to as groundwater. The top surface of the groundwater is called a "water table".

Transpiration: In simple terms, transpiration is the release of water from plant leaves. The outer layers of leaves and some stems have small openings (stomas) that allow gas exchange and regulate water loss. Losing water vapor cools the plants down in hot weather, and water from the stem and roots moves upward into the leaves.

Runoff: This term refers simply to water running off the surface. If I wash my car, the water from my hose or bucket might run off my driveway. In nature water runs downhill due to gravity. The water that runs off the surfaces can wash soil and pollutants off those surfaces and into bodies of water.

Storage: This refers to the three locations where water can be (stored) during the water cycle. Water can either be in the atmosphere, on the surface of the earth (including in bodies of water), or in the ground.



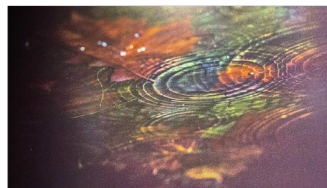


What is a Water cycle?

Earth's water is always in movement, and the natural water cycle, also known as the hydrologic cycle, describes the continuous movement of water on, above, and below the surface of the Earth. The water is always changing states between liquid, vapor, and ice. With these processes are continually happening over millions of years. The Kentucky River, and all the water in the watershed, is part of the global cycle. Imagine the river cycle, here in our watershed, during the summer. There is often fog (transpiration) in the early morning and evaporation during the heat of the day. Clouds form that may or may not cause rain. The clouds might go east, over the mountains and rain down on West Virginia! Rain might move in from the western states. In June of 2022, smoke from the western forest fires traveled the upper atmosphere in the clouds and then rained down on the Kentucky River Watershed. Kentucky's air and water are connected to these other regional and global places. Our Kentucky River flows north to the Ohio River then east into the Mississippi River and on to the Gulf of Mexico! Then the cycle starts again.

**Our water has been here since the earth formed.
Dinosaurs might have drunk the water we drink now!!!**

The study of the water cycle falls under the subject of physical geography and is called hydrology (or Hydrology Cycle as referred to in many textbooks). Hydrology studies and uses developed concepts from many other sciences (i.e., mathematics, physics, engineering, chemistry, meteorology, geology, geography, etc.) and therefore is an interdisciplinary science. It is the basis for managing and developing water resources. Art is, also, involved in the illustration and visual concepts of the water cycle. Hydrology deals with the origin, distribution, and measuring the movement of water within the stages of the water cycle.



Movement of the water through the water cycle does not happen at the same pace. For example, water in the atmosphere moves to another stage in the cycle about every 16 days, soil moisture cycles about once a year, water in the wetlands cycles about every 5 years, and lake water cycles every 17 years. Groundwater might take 1400 years to completely recycle. Water might also be stuck frozen in a glacier for thousands of years.

Remember, there is no new water on earth. The same freshwater has been moving through the stages in the water cycle for thousands of years!!! This uneven movement of water can have big consequences, such as causing floods and droughts in certain areas! Pollutants are carried through this cycle repeatedly! With all these factors involved, it is easy to see that the water cycle is a complex process with widespread implications in the Kentucky River Watershed, our state, our nation and our world.

Now let us take an imaginary trip with our magical creature, Eluama, through the water cycle

Visualization Activity:

Eluama's (Elu=beautiful and ama=water in Native American language)

The adventures and responsibilities of this dear and ancient creature are shared through her network of creatures, great and small. To explore the water cycle with her we must first make ourselves as small as a drop of water. She can carry us on her back! Imagine floating on the Kentucky River until the sun kisses you and you slowly rise through the air (evaporate). Maybe you hang around as fog for a while then continue your journey to the clouds (condensation). You might hover over the river and the land (watershed). Think of what you will see from this new perspective: You will see the rivers, lakes, forests, palisades, and villages from above. Then, when there are millions of collected water drops just like you, the cloud becomes heavy, and you will turn into rain (precipitation). You will rain down to the land. Maybe you will roll down a hill or land on a tall tree. The tree will absorb some of you, and the other waterdrops. When the sun comes out, the tree will release you (you will transpire from the leaves) and you will ride the magical Eluama back to the sky to form another cloud (evaporate). This time you might leave the Kentucky River Watershed all together! You might ride to a far-off exotic place to start the water cycle over again!

This water cycle is as old as water on the earth. Eluama reminds us that each water drop is billions of years old and that the earth and the natural world recycle the water over and over again! To rest, Eluama is going to enjoy a nice cold mint slushie (see recipe below!)

In summary isn't this mind boggling?? All life on earth depends on the water cycle process! The same water droplets are just recycled to differ-

ent places in the world's water systems during the timetable described above. Water we drink today may have been part of a glacier, been in the Nile River or been consumed by dinosaurs!! So, all pollution impacts ALL LIFE ON EARTH!!!!

End Student Text



ADDITIONAL ACTIVITIES: Assign one, or more, of the following to the entire class or cooperative learning groups at teacher discretion.

Student Text (print or send to student Chromebooks/devices)

- **HANDOUT:** Students draw their own simple sketch of the water cycle, label the stages in the water cycle, and color their drawing. Add to journal. See handout in **RESOURCES** .
- **OBSERVATION:** Place a mug in the bottom of a bowl. Add water around the mug so that it comes up about 2/3rd of the mug. Draw on the bowl, mark where the water level is. Cover the bowl tightly with cling wrap and fasten it around the bowl with a string or a rubber band. Note in your journal what happens.
- **WRITING:** Elaborate on the story of the mythical, magical, Eluama riding on a water droplet as it moves through the water cycle. Let your imagination run wild as you take this ride though the water cycle. Add to journal.
- **POEM:** Write a poem about the different stages you encounter in the water cycle. You might feel it is majestic to ride on the water droplet, you might feel sad as you get washed into the gutter with some trash, etc. See **HANDOUT** giving examples of the different forms of poetry.
- **HANDOUT:** Build the terrarium as directed on the handout to simulate the water cycle.
- **ACTIVITY** described in the chapter: Simulate EVAPORATION.
- **ACTIVITY** described in the chapter: Build a Water cycle, terrarium.
- **HANDOUT: Recipe:** Stuck in a Glacier Chocolate Mint Cookies.
- **HANDOUT:** Make a poster showing the water cycle. Use the suggestions and samples from **Making posters POP!** in **RESOURCES** ..
- **Stewardship** - Clean up your local creek, river, or school parking lot! Count the bags and report to the school office.

SOURCES:

<https://www.science-sparks.com>Carla Mooney: -EXPLORE Rivers and Ponds-With 25 Great Projects, Nomad Press, ISBN: 978-1-93674-980-5

https://www.nrfc.noaa.gov/info/water_cycle/hydrology.html

<https://www.usgs.gov>

<https://kids.britannics.com>

Wikipedia

<https://www.historymuseum.ca>



9 Lock and Dams and Travel on the Kentucky River

Pat Banks and Roberta Hounshell



Bill Ellis, Retired foundation Professor at Eastern Kentucky University, The Kentucky River

"It sounds trite, a well-worn cliché today, but we human beings really do try to dominate nature. From their first sighting of the Kentucky (River), Euromericans envisioned ways in which the river could enrich their lives. Early on these dreams included harnessing the river for its economic benefit."

"Whither the Kentucky River? It is in the hands of it's people. Perhaps the best hope lies in the young people who are much better educated environmentally than their forebears, but all Kentuckians must do what we can to protect this valuable, irreplaceable resource."

Time:

Allow 1 period for the basic lesson and additional periods depending on how many activities are selected for completion.

Note: for more technically minded students, there is a STEM lesson plan attached for grades 5-7 in which students are introduced to the structure, function, and purpose of locks and dams. This STEM plan involves an introduction to Pascal's law, water pressure, and gravity including an engineering connection. (<https://www.teachengineering.org> Locks and Dams).

Unit Objective:

Discover the Kentucky River Watershed Through History, Science, Art, Culture, Conservation, Recreation, and Education.

Lesson Objective:

- Students will be able to describe the lock and dam system, and how it works.
- Students will be able to describe the purpose of locks and dams on the Kentucky River, now and in the past.
- Students will be able to describe the different kinds of boats/vessels used on the Kentucky River.

Materials:

- Student text printed out (if it is not sent to student devices).
 - Journal: updated journal with handouts and sketches.
 - Materials for the various activities as specified with each activity.
- RESOURCES.**
- Highlighters.
 - Printouts of the support document for activities as selected. **RESOURCES.**

Procedure:

- Pre-assessment: Brainstorm what students know about locks and dams. Record their answers so that you can compare pre-lesson knowledge and post-lesson knowledge. NOTE: The use of Cooperative Learning Strategies is encouraged.
- Watch the following 6-minute video on YouTube: "Kentucky River Lock and Dams". Scroll until you see: VIDEOS then, "Kentucky River Locks and Dams", YouTube Ky Afield, May 4, 2015 6:11 with David Hamilton, Director of Kentucky River Authority. Discuss and note on a chart what students remember after having watched the video.
- Students read text taking turns or the teacher reads text while students follow along and highlight .

Discuss the following:

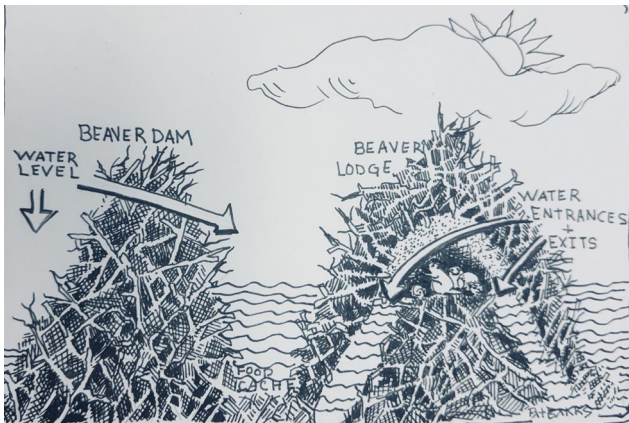
- Explain the function and purpose of a lock and dam.
- What are the stages in the life of the Kentucky River according to the book by Dr. William Greer?
- What different boats /vessels were/are used on the Kentucky River? Build a raft, see **RESOURCES.**
- What does the author mean by describing the river as having separate lives?
- Select an activity to be completed as a group or assign one or more activities to cooperative learning groups. Have the groups present to the whole class.
- Drawing the process of the lock function can help with the understanding of the lock process.
- Journal Entry / post assessment.

Thoughts on Locks and Dams and Travel on the KY River, by Mary Hufford PhD

Long before Pascal developed a theory that engineers could apply to the building of locks and dams on the Kentucky River, there were landscape engineers at work on the Cumberland Plateau, molding the waterways of what would in time become the Kentucky River. We know these engineers today as beavers and crawdads. Wildlife biologists classify beavers and crawdads as “ecosystem engineers,” Both shape extensive wetland habitats that benefit many creatures. Beavers have been in North America for eleven million years. Crawdads evolved much earlier than that: 200 million years ago. Many creatures make nests of mud, plant materials, and silk which they produce or scavenge from others.

Hummingbirds bind lichens together with spider webs. Robins fortify their grass-lined nests with mud. Funnel weaver spiders hide out in webs that can trap their food. Caddis fly larva build protective cases of sand grains, twigs, leaves, pebbles, and even cases discarded by other larva, holding it all together with silk produced from their tiny bodies. They can make nets with their silk to capture prey, and they make Blending in with the creek bottom, they are safe from predators. But none of these creatures maintain entire ecosystems through their home building activity.

Until beavers were trapped to near extinction between the 17th and 19th centuries, they extensively controlled headwaters of the Appalachian Plateaus by building ponds, dams, and lodges where they raised their families.



Their activity created habitat for fish, amphibians, reptiles, waterfowl, and creatures that came to the ponds to drink and capture food. Aquatic vegetation took over the areas managed by beavers. They had to maintain their dams and lodges, and their activity changed the course of waterways, turning some areas into marshes, which flowed through meandering streams to join the tributaries. Containing and redirecting water, strengthening banks with root systems of water-loving plants, the activity of beavers provided flood control throughout the Cumberland Plateau. When the beavers disappeared, nobody was there to manage the beaverscapes. Sedimentation of waterways from extensive logging in the late 19th and early 20th centuries further undermined the flood resistance that beavers had provided. Some places in the country have restored wetland habitats by reintroducing beavers. Could this be part of a solution to the problem of flooding in the region?

Beavers were busy indeed when the first European settlers arrived, judging from the number of places named after them: Beaver Bottom, Beaver Creek, Beaver Gap, Beaver Lick, Beaver Dam, Beaver Fork, Beaver Knob, and more. These are the kinds of places that appear in the mountains of Kentucky, important landmarks for early settlers. Do you know what “bottom,” “gap,” “lick,” “fork,” and “knob” mean?

Another example of an ecosystem engineer is the crawdad. Have you ever fished for crawdads at night? Or attended a crawfish boil? You may know the tune to a famous song with the words: “You get a line and I’ll get a pole, and we’ll go down to that crawdad hole!” You can hear the Foggy Mountain Boys sing it [here](#).

In contrast to the beavers, crawdads have no places named after them in Kentucky. Yet their ecosystem engineering created habitat for headwater flora and fauna for millions of years before beavers entered the scene. There are more than 50 species of crawdad in Kentucky. Some live in streams while others create burrows in the uplands. Crawdads come in many colors, including brown, black, blue and red. Upland burrowing crawdads (*Cambarus dubious*), found at the headwaters of the Kentucky River, are a species of greatest conservation need in Kentucky. Some people call them “mudbugs.” They create large underground systems of tunnels and rooms that connect land surface to the water table. You may have seen their large “chimneys” as you walk beside a stream or through a marshy area.



from https://www.waldeneffect.org/blog/Crayfish_in_the_garden/

Below the chimneys, a maze of tunnels provides habitat for many creatures, including snakes, frogs, salamanders, spiders and dragon flies!! There, cool, moist underground chambers offer shelter in times of drought. If the water table gets too low, crawdads may temporarily close up their chimneys, protecting the water supply by slowing down evaporation. They’ll open them again when it rains, because oxygen is also crucial for the underground habitat. Next time you see crawdad chimneys, take a moment to marvel at the achievements of these ecosystem engineers.

STUDENT TEXT:

The Kentucky River, Locks and Dams and Travel

Introduction

Travel on the Kentucky River is amazing. Imagine traveling a hundred years ago on a Riverboat. You would possibly be traveling with your family. You might get on board the Riverboat (paddle wheeler) at Beattyville to travel to Frankfort so your dad can conduct some business. You will hear the sound and feel the vibration of the powerful paddle wheel. The bustle of the crew, the sound of the calliope in the drawing room, the smells of the food cooking in the diner and the excitement of the trip has your senses reeling! The next morning you are sitting with your family on the fore deck watching the blue herons leave their nests to hunt breakfast for their young, the deer and elk gathering at the edges of the river to drink and the river otters playing and swimming while going about their day. The palisades, woods, fields and river have been wonderful but you loved 'locking through" the locks! You wave at the lockmaster and he waves back! What an adventure to tell your friends!



An excursion or party boat the Kentucky that ran up and down the river in the 1920-1930s



Vocabulary:

Lock - a short, confined section of a canal or other waterway in which the water level can be changed using gates and sluices, used for raising and lowering vessels between two gates.

Dam - is a barrier that stops or restricts the flow of surface water or underground streams. Reservoirs created by dams not only suppress floods but also provide drinking water reserves.

Paddle boat - a small recreational boat powered by pedals that turn a paddle wheel or a large boat powered by an engine to turn its paddle wheel.

Barge - a flat bottomed boat for carrying freight, typically on canals and rivers, either under its own power or towed by another vessel.

Dugout canoe - a canoe made from a hollowed tree trunk

Lockmaster - is a person who immediately directs and maintains the operation of a lock

Keel boat - a large, flat freight boat used on rivers.

Flatboat - Wooden rectangle vessels (often used in the past) of varying sizes depending on their use for freight or family. These boats were known by many names: Immigrant Boat, Kentucky Broadhorn, and Ark, to name a few.

Slack water- a calm pool of water created by the lock and dam structures on the river. It accommodates boats on a river.

A Brief history

According to William Grier, "The Five Lives of the Kentucky River", "A river is a living creature. It has personality, feelings, moods, and its own life." The first people used the river as a place to settle, build their villages, raise their crops, and as a "water path" for travel and trade. The early settlers also used the river as a water path to travel up and down the river and to reach the fertile Bluegrass area. The wild, untamed river was shallow much of the year and was unpredictable but navigable during the spring "tides" (floods). Canoes were the vessels of choice before the locks because they could be lifted and portaged around obstacles and shallows. Rafts were easily put together from logs, for moving goods and family when the river would accommodate the larger vessel, usually the time of the spring tides.



In the book, "The Five Lives of the Kentucky River", Dr. William Greer describes the lives as:

Life 1: The Native Years, prehistoric to the late 1780's - The first people of the Kentucky River Basin lived, fished, hunted, and made settlements (some settlements were thousands of people strong!) for over 12,000 years.

Life 2: Flat Boats and Keel Boats to the Dawn of Steam, late 1780'S through 1842 - Thus began the European settlement of the region and the era of salt, tobacco, corn, iron, timber and coal extraction. There seemed to be a never-ending supply of these natural resources. River travel was the best way to move these products. The exploitation and exportation of these "commodities" became a source of great wealth and pride. The need to control the river became important.

Life 3: The Golden Age of Locks and Dams, 1842-1932 - The first five locks and dams were constructed with log cribbing that resembled giant Lincoln Logs that children play with. Steamboats, barges, and paddle boats were the vessels of commerce and travel. By this time, rebuilding and extending the navigation system was continuous. This "slack water" system made commerce on the river more predictable and profitable for the merchants, businessmen, and farmers.

Life 4: Decay and decline 1931-1986 - This was another time of change. The importance of commerce on the river was diminished by overland travel. Flooding, also, took its toll on river infrastructure. Coal and timber were being hauled by truck and rail. The extraction industries started winding down on the river, but mountaintop removal and clearcutting practices took their toll on the river's health. The skies darkened because of the reliance on fossil fuels and acid rain became a problem. The mission of the Army Corps of Engineers had been to provide flood control and to support river commerce. During this era, they started to transition their activities. When the commerce on the river receded, the corps saw its mission coming to an end. So, through a series of proposals and agreements the Kentucky River Authority was born.

Life 5: Municipal water supply - The new mission of the Kentucky River Authority was to improve the quality of the water of the Kentucky River, through environmental, management, maintaining the safety of the lock and dam structures, and the promotion of access and recreational activities.

And the next life of the Kentucky River!

Life 6: Water Quality and the Kentucky River Water Trail - This chapter is to be written by the generations to come! YOU! We have important decisions and choices to make, on a personal level, family level, local and state level.



About Locks and Dams

The lock and dams were created to control the flow of water and make the river navigable most of the year. The first lock was built in 1822-42 and the last, #14, was built in 1911-17. Flat boats, barges, and riverboats (steamboats) plied the river carrying out timber, coal, tobacco, salt, and other resources. Why was there a need for locks and dams? Because the wild, untamed river was shallow much of the year. The river was unpredictable and only navigable during the spring "tides" (floods).

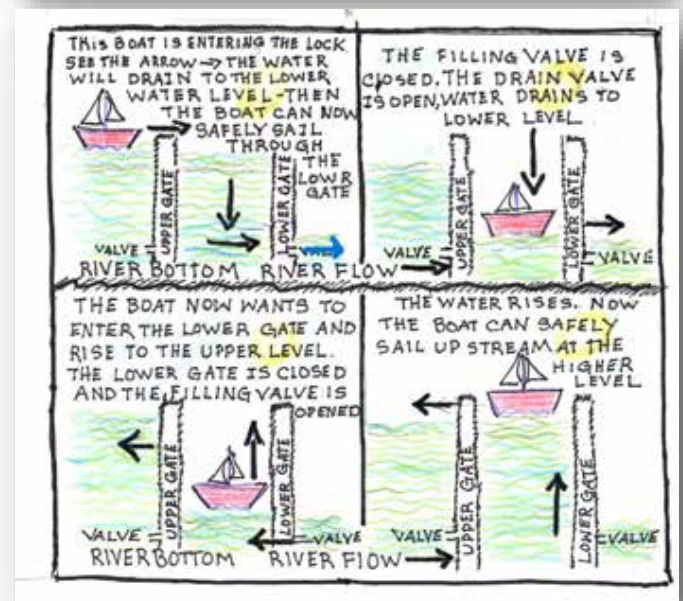
The Kentucky River begins in the high elevations of Pine Mountain at, approximately, 1745 ft above sea level. As water flows downhill the elevations keep dropping until we get to Carrollton Kentucky at about 420 ft above sea level. When a dam is built it holds back some of the water creating pools. The lock (located in the dam) is a chamber that lowers or raises boats to the right water level. It allows boats to navigate from one level (pool) to the other. A lock is big enough for a boat and has gates at each end. The river above the lock and dam is higher than the river below the lock and dam.

How does a lock work? When a boat is going downstream, the lock is filled with water when a filling valve is opened. Based on Pascal's Law, we know that water, in a closed system, will seek to find its same water level throughout. So, when a filling valve is opened, the lock chamber quickly fills with water until it reaches the same level as the river upstream of the lock. Then, the upstream gate opens and the boat moves into it. To lower the boat, the gates are closed behind it, the filling valve is closed, and the drain valve is opened. The higher water in the lock chamber drains to the downstream level in a few minutes. At that point, the downstream gate is opened, and the boat moves out onto the lower water level. Some of the locks, on the Kentucky River, have small hydroelectric plants, located on site, that produce green energy.

A dam is a barrier that stops or restricts the flow of surface water, or underground streams. In the process, reservoirs are created that provide water for irrigation, drinking water, industrial purposes, and aquaculture. The dams, also, aide in suppressing floods. The 14 locks and dams on the Kentucky River were, originally, put in place to enable the river to become navigable and they allowed commerce to take place year-round.

So, if locks and dams were so beneficial, why are only locks 1-4 on the Kentucky River still functional today? The development of the railroad system and modern trucks enabled the transportation of large loads over faster routes. These modes of transportation have taken the commercial business (coal, timber, iron, salt) away from the river barges. In fact, Locks 1-4 were only recently rehabilitated for use for tourism.

Aerial views above the lock and dams.



Drawing of the operation of the lock system.

See RESOURCES.

Early boats on the Kentucky

Dugout canoe

Native Americans, often, traveled in dugout canoes. Early Euro American fur trappers also used the native style canoes. The first step in making a canoe was selecting a tree of the right size. A small fire was built at the base of the tree until it fell. Then, the tree was hollowed out using a controlled fire or steam. Next, the softened wood of the hollowed-out tree would be scraped with shells or stone tools. The same process was used to shape the straight sides and the flat bottom of the canoe. Many of these canoes were small enough (the length of a log) so they could be carried around (portaged) obstacles from one river pool to another. Canoes are documented to have remained valuable in the lives of Native people throughout history and now modern canoers and kayakers!

Flatboats

According to the Heritage Village Museum the early settlers constructed their boats with hardwood. There were many names for their boats including immigrant boat, Kentucky Broad Bottom, Ark, and Flatboat. These vessels were made in various sizes depending on their use (freight or family). Lacking a keel, the boats were steered with a large sweep in the stern that was between 30 to 50 feet long. After reaching their destination, the hardwood boats were, usually, dismantled by the family or by the business. The wood was used to build homes or sold. (The Heritage Village Museum has a replica of Kentucky Broad Boat: Heritagevillagecincinnati.org)

Dr. Bill Ellis wrote, "In 1774, James Harrod brought his pilgrims down the Ohio River by flatboat and then up the Kentucky to a spot near present day Shaker Landing."



Make a flat boat with natural materials. See **RESOURCES.**

Based on Pascal's Law: we know that water, in a closed system, will seek to find its same water level throughout.

So, when a filling valve is opened, the lock chamber quickly fills with water until it reaches the same level as the river upstream of the lock. Then, the upstream gate opens and the boat moves into it. To lower the boat, the gates are closed behind it, the filling valve is closed, and the drain valve is opened. The higher water in the lock chamber drains to the downstream level in a few minutes. At that point, the downstream gate is opened, and the boat moves out onto the lower water level.



Day in the life of a Lockmaster

A Lockmaster is a person who directs the operation and maintenance of a lock and dam. The lockmaster and the lockman's jobs (lockmaster's assistant) were well respected, and they had many responsibilities at the lock and dam and property. Their day would start before dawn and included these responsibilities:

The first thing on the agenda was to take and record the air temperature for the records.

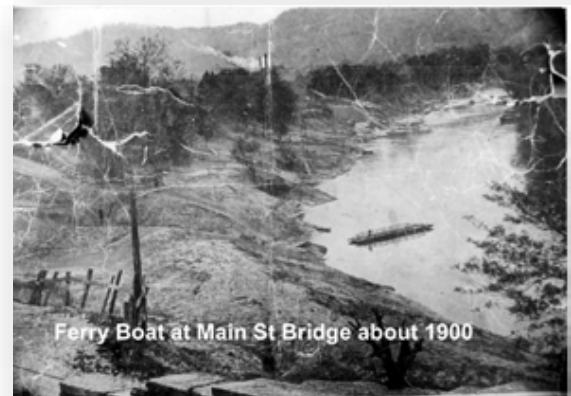
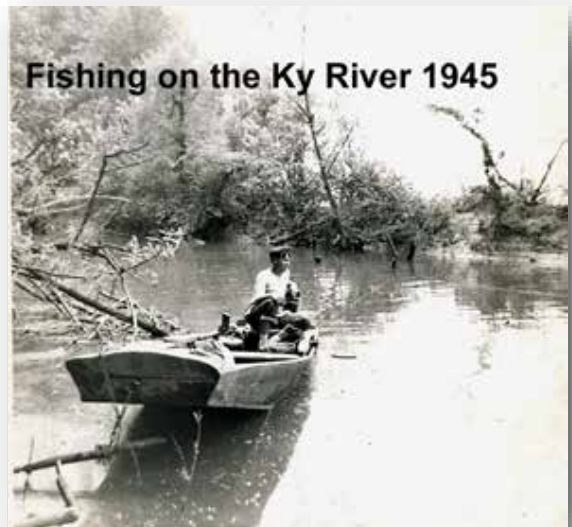
- Record the upper and lower water gages.
- Put out and take down the lanterns that were used to guide the boats at night.
- Lock boats through the locks. Before modern electricity, the gates and valves were operated manually. The expertise of the lock man was critical to maintain safety. They had to work with detailed timing and precision to keep the boats from crashing into the walls or doors and becoming damaged.
- Record the passage of each boat including the date, time, and other information.

When the lockmaster and Lockman were not locking boats, they were responsible for the "reservation", which included maintenance of the lockhouses, outbuildings, the grounds, and the lock and dam structures. The Army Corps of engineers did regular inspections. The Lockmaster and Lockman had houses on the property. Many of these properties were very remote, so much of the food for the Lockmaster, Lockman and their families was grown or raised on the property. They, often, raised chickens for eggs and meat, cows for milk and butter and grew vegetables. They were very self-reliant.



Excursion boat going thru the locks at # 12 in late 1920s

Historic photos supplied from the collection of
Tom and Francine Bonny.



ACTIVITIES:

The teacher can choose to do one of the following activities as a class or assign one or more activities to cooperative learning groups (which then can share their findings with the class upon completion). Write a poem about any of the concepts presented in this chapter.

- Build a flat-bottomed boat (raft). The directions are in the **RESOURCE** section.
- Explain Pascal's Law to your class (you will find it in the text. You can also research what other sources say).
- Draw a schematic of a lock and dam on a poster and present it to your class. RESOURCE section .Add to the journal.
- Pretend you want to apply for the job of a lockmaster. Write a resume that fits the requirements (you might want to do research beyond what is presented in this chapter about the job of a lockmaster. Go to Eastern Kentucky University's, Library, historical archives. **It** contain interviews with former lockmasters by author Bill Ellis) - Also see guidelines for writing a resume in the **RESOURCES**.
- Pretend to go down to the river to tell Eluama about how locks and dams work and what their purpose was /is. Be sure to include questions Eluama asks about this topic.
- Pretend you are a lockmaster writing a letter to your pen pal. He/she asks what a typical day in your life looks like. Include job responsibilities, as well as what you do after work (this is YOUR day, so what you do after work would be specific to YOU).
- Explain what author William Greer means by, the five lives of the river. Give a short explanation of each "life". What is the sixth life?

You have just purchased a historic paddle wheeler and want to use it to open a tourism business on the Kentucky River. De-sign a poster, or write a story, to get your customers and tourists interested in the new venture! Describe what they will see on their paddle wheeler journey, what they can eat, and what the boat looks like inside, etc. Make it so inviting and inter-esting that people will want to include a trip on your boat (**by all means**) in their vacation plans!! American Notes- olume II, Chapter the Third-1 2

**Use the enclosed recipe for Blackberry Cobbler . Get a taste of the past!
Bake one for the class.
Blackberries were and are still plentiful in the Kentucky River watershed.**

POST LESSON ASSESSMENT:

- The teacher compares knowledge from the brainstorm, prior to the lesson, to the knowledge students have after the lesson by comparing key content.
- The teacher assigns one of the questions to answer in the student journal: (Students can choose, or the teacher can select the question). Note: write concepts and key words on the board and have students complete the answers using their notes.
- Students will be able to describe the lock and dam system and how it works.
- Students will be able to describe the purpose of locks and dams on the Kentucky River, now and in the past.
- Students will be able to describe the different kinds of boats/vessels used on the Kentucky River.
- Students document evidence of the activity they completed in their journals.

References and websites:

Dr. William f. Grier, **The five Lives of the Kentucky River**, Jesse Stuart Foundation, 2001.

Dr. William Ellis, **The Kentucky River**, University Press of Kentucky, 2000.

Kentucky River Navigation Charts, Kentucky River Authority

Heritagevillagecincinnati.org

KyRiverkeeper.org



Resources

Kentucky Geological History

Chocolate Lava Cake

On your trip through the geological history timeline of the Kentucky River Watershed there were several volcanic eruptions. While you make and eat your lava cakes, think about the power of the earth and the heat a volcanic eruption produces! I bet the lava cakes will “EXPLODE” in your mouth!!! It will take less than 30 minutes to make this cake!

Prep time: 13 minutes

Cook time: 8 minutes,

Make 6 cakes

Equipment you will need:

6 ramekins
Baking sheet
Double boiler
Electric mixer
Mixing bowls

Ingredients:

½ cup unsalted butter
6 ounces bittersweet chocolate chopped (or chocolate chips)
2 large eggs
2 large egg yolks
¼ cup granulated sugar
1/8 teaspoon salt
2 table spoons all-purpose flour

Optional:

walnuts (for the rocks in the lava)
fresh peppermint leaves (to show that the earth is regenerating after the volcanic eruptions!)



Caution: TOP SECRET TIP: If you want to eat this lava cake again have no worries. There were several volcanic events during the geological formation of the Kentucky River watershed, so you can bake this cake again as a scientific experiment. You might even beg your teacher to assign the recipe as homework!!

Directions:

Preheat oven to 450-degree F

Butter and flour 6 ramekins

Place ramekins on a baking sheet

Combine the butter and chocolate in a double boiler and melt over low heat, stirring until the mixture is smooth OR

Place the butter and chocolate in a microwave safe bowl on high, stirring every 30 seconds until melted. Whisk until smooth.

In a large mixing bowl, combine the eggs, egg yolks, sugar, and salt. Beat on medium heat until thick and light yellow.

Stir in the nuts if you want to include them.

Divide the batter among the prepared ramekins.

Bake for 6-8 minutes or until the sides of the cakes are firm set but the center is jiggly. Let the cakes cool in the ramekins for 1 minute.

Place a small plate over the top of each ramekin and turn over carefully onto the plate. Wait about 10 seconds before you take the ramekin off, so the cake can unmold.

Sift powdered sugar on top and place the mint leaf on top!!

ELUAMA'S SMOKED TROUT CAKES

Here is Eluama's favorite dinner on Sundays, or on any day that feels like Sunday!
As the recipe makes 12 cakes, she might share one or two with her best friend Equoni.

You will need:

Trout Caught fresh from the Kentucky River

Green onions (at least 4, but more are fine.

Eluama loves green onions!)-finely chopped

1/4 cup finely chopped sweet red peppers

1/4 cup finely chopped yellow peppers

1/4 cup Dijon Style Mustard

1 garlic clove (2, are ok also. If you roast this in the pan with a bit of olive oil, Eluama will be extra happy!)

1/4 cup mayonnaise

2 tablespoons lemon juice

1-2 tablespoons capers, drained (Eluama is wild about capers!)

1/2 teaspoon cayenne

1 teaspoon mix of paprika, salt, pepper

1 pound smoked trout, flaked, skin and bones removed You can also use grilled trout too!

1 cup soft bread crumbs

2 tablespoons olive oil

- In a large bowl (do NOT borrow the one your gold fish uses) combine onions, and red and yellow peppers. Of course you remembered to chop these into very small pieces.
- Add mayonnaise, mustard, garlic, lemon juice, drained capers, seasoning, and cayenne pepper. Add fish and breadcrumbs. Mix well.
- Shape trout mixture into 12 patties, 2.5 to 3 inch diameter across (get your ruler and measure, or your cakes will be too small or too big, and Eluama likes them exactly that size).
- Put cakes into the refrigerator for about an hour so the mixture will firm up.
- Heat olive oil to medium heat in a large skillet.
- Put trout cakes into the skillet and cook for 4-5 minutes until lightly browned, turning one time after about to 2 minutes.
- Transfer trout cakes to an ovenproof platter or cookie sheet and keep warm in a 300 degree F oven until all cakes are cooked.



Serve promptly to Eluama
(or your family if you must).

ENJOY!





Eluama's Magical Bountiful Zucchini Berry Muffins

We know this recipe is a mouthful, but this recipe is also full of stories and flavor as its name implies! When Eluama first moved to the Kentucky River, she encountered Native people who told her of their love for nature and how they take care of the natural world (stewardship). They also talked about many tasty foods they ate especially juicy blackberries! They shared this recipe with her. Eluama, used her magical powers to make this recipe all by herself. She shared her first batch of muffins with her first and best friend, Equoni, the river otter, and he shared with the bluebirds! When you eat these muffins, get in touch with nature and take your friends on a river walk along the Kentucky River. Practice good stewardship and pick up any garbage or trash that someone may have dropped! It takes all of us to keep our river clean!

Ingredients:

3/4 cup of oil (or Buttermilk)

3eggs

1.5 cups of honey (or 2 cups of sugar)

2 cups washed shredded zucchini (grown next to the other sisters, beans, and corn). After you shred the zucchini wrap in a towel and squeeze some of the water out. You will be surprised how much moisture comes out!

1 cup blackberries (fresh of course, but if frozen, add while still frozen)

3 cups of all-purpose flour

1 teaspoon baking soda

1 teaspoon of cinnamon

Procedure: Mix all ingredients together by stirring and stirring and stirring, until all is mixed well. Grease a muffin pan (if you must, use cupcake liners this once). This should make 12. Bake in a 350-degree F oven for about 25 minutes or until the center of the muffins are done. Use a toothpick stuck down the center of a cupcake to check, if it comes out clean, it is done.

At this point, it is time to call your friend Equoni so that you can enjoy some muffins together. You might also call some other friends to share some stewardship ideas for cleaning up the Kentucky River!



Peppermint, Spearmint Mint Tea and Slushies

There are dozens of types of mints, beebalm, cilantro, basil etc. When you pick a mint leaf gently rub it between your finger, now smell the mint! It has released a wonderful aroma. We are using peppermint and spearmint for these recipe suggestions. Mint has long been used for hundreds of years as good medicine for queasy stomachs, calming nerves and promoting sleep. Mint is also delicious in salads, pesto, tea and so much more! Mint loves going in the Kentucky River watershed!

Make this recipe: **Peppermint, Spearmint, MINT TEA or MINT TEA SLUSHIE**

3 cups of clean clear water.

Bring the water to a boil.

2 cups of fresh mint.

Add mint to the boiling water.

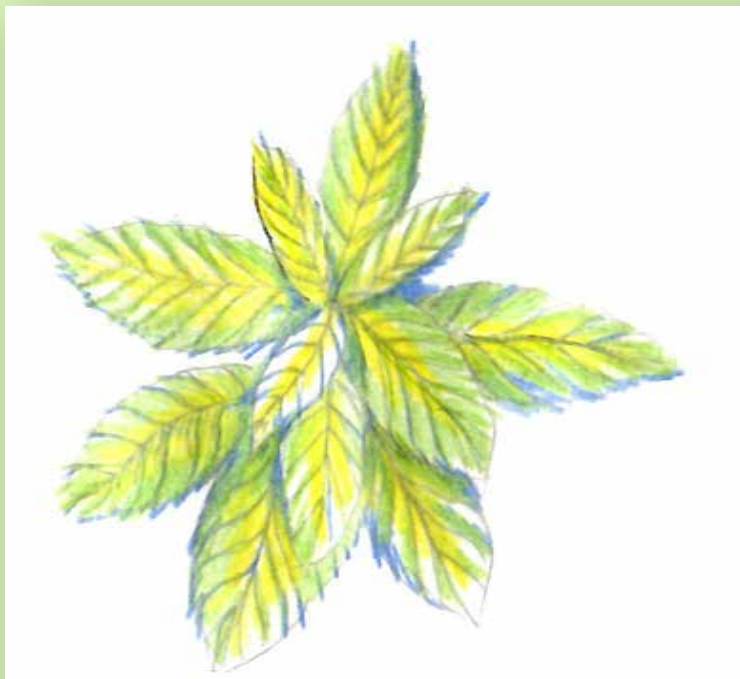
Turn off the heat and let steep for 10 minutes.

Strain out the mint and pour the hot tea into a large pitcher.

Add 4-6 cups of cold clear clean water.

Add sugar or honey to taste. Start with $\frac{1}{4}$ cup, add more as needed, stir to dissolve.

For slushies pour half of the mint tea into ice cube trays. Let it freeze. Then put some of the frozen tea cubes into the blender, add some of the reserved tea and blend! Now you have a wonderful frozen mint slushie! Put a fresh leaf on top of your slushie for decoration.



Wild Edible Flowers and Greens

Green Salad

Early spring in the Kentucky River Watershed is the perfect time to pick greens from your yard or field! Generations of native people and settlers have foraged for these spring gifts from nature. These wild plants were the first fresh vegetables that they would have had after the long winter of dried and preserved foods.

It is important to collect these greens with an experienced forager and/or a pictorial field guide. Foraging area should also be pesticide free. These plants are sweet and tender in the early spring while young! Pick a handful of each of these plants. Wash well in cool water and pat dry. Wrap in damp paper towels and place in the refrigerator till ready to make your salad. You can also just add a few of these greens to your “store bought” lettuces.

- Dandelion Greens
- Mint (any variety)
- Ramps (wild leeks)
- Chickweed
- Red Clover
- Fiddle Head Fern
- Nettle
- Lambs Quarters

Simple Dressing

- Juice from 2 lemons or (1/4 cup of cider vinegar)
 - Salt and pepper to taste
 - ½ teaspoon honey
 - ¼ cup if olive oil (add more to taste)
- Whisk to mix or shake in a lidded canning jar.



Edible Flowers

These flowers can be added to any salad as they blossom throughout the spring and summer. If a blossom has a white base, cut it off as it might be slightly bitter. These colorful flower petals add beautiful color, vitamins, and minerals to any green salad. As with the greens gently rinse in cool water and pat dry. Wrap in damp paper towels and place in the refrigerator till ready to make your salad. You can also just add a few of these flowers to your “store bought” lettuces or add beauty to the top of a cupcake!!

- Daylily
 - Squash blossom
 - Marigold
 - Blackberry blossoms
 - Nasturtium
 - Pansy
 - Rose petals and pips
 - Lavender
 - Tulip
 - Violet
- (there are other blossom too)



Three Sisters Casserole with Cornbread topping



Three Sisters Casserole with Cornbread Topping

Makes 8 servings

For the cornbread topping:

- 1 and 1/4 cups yellow cornmeal
- 1/2 cup all-purpose flour
- 2 teaspoons baking powder
- 1 teaspoon salt
- 2 tablespoons unsalted butter, melted
- 1/2 cup whole milk
- 1/2 cup water

For the Filling:

- 3 tablespoons extra virgin olive oil
- 2 tablespoons tomato paste or 1/2 cup dried tomatoes
- 1 yellow onion, diced
- 4 cloves of garlic, minced
- 1 pound of any squash or pumpkin, peeled and cubed

Continued:

- 1 can (15 ounces) diced fire roasted tomatoes
- 1 teaspoon coriander
- 1 and 1/2 teaspoon ground cumin
- 1/2 teaspoon chili powder
- 1/4 teaspoon smoked paprika
- 1/2 teaspoon salt
- 1 cup vegetable broth
- 1 cup fresh or frozen corn kernels
- 1 (15 ounce) can of any beans, rinsed and drained
- 2 cups chopped spinach or kale

Preheat your oven to 350 degrees F. Grease a 9x13 inch baking dish and put it aside.

Next make the filling:

- Use a large skillet or a Dutch oven (**or if you are adventurous, a cast iron pan with a lid over an open fire!!!**)
- Put the oil in, heat it, add the onion and cook for about 4-5 minutes.
- Add the garlic and cook for another minute.
- Add the squash, tomatoes, tomato paste or dried tomatoes, spices and salt. Add in the broth and bring mixture to a boil.
- Cover the pot and turn down the heat. Simmer for about 15-18 minutes or until the squash or pumpkin is tender.

While it is simmering:

- Mix the cornmeal, flour, baking powder, and salt. With a wooden spoon slowly stir in the butter, milk, water. Set aside for about 10 minutes.
- Get back to the filling that has been simmering and add in the corn, beans and greens. Continue cooking, covered, for 3-5 minutes until the mixture thickens and all ingredients are well mixed.
- Transfer to a baking dish (or if you are adventurous and cooking over an open fire just add the cornbread mixture in biscuit sized clumps on top of the mixture in your cast iron pan and put the lid on!)
- Form generous biscuit sized clumps of cornbread topping and place on top of the mixture
- Bake for about 20-25 minutes 350 degrees (the adventurous cook needs to check the iron pan in the open fire to see when the cornbread is done!)

Let the casserole sit for about 5-10 minutes before serving!!

This freezes well should anything be left over!!! If you do so, let it thaw in the refrigerator overnight and warm in a 300-degree F oven until heated through.

Burgoo



Stewardship Recipe:

This soup is fun to make in the classroom. Everyone can participate by bringing a can of their favorite vegetable! **During the pioneer days of Kentucky, farmers and hunters often made a hearty stew. It was traditionally cooked outside over an open fire, in a big iron caldron. Each family or community created and maintained their own recipe and cooking traditions. It was handed down from one generation to the next.**

The Usual Ingredients:

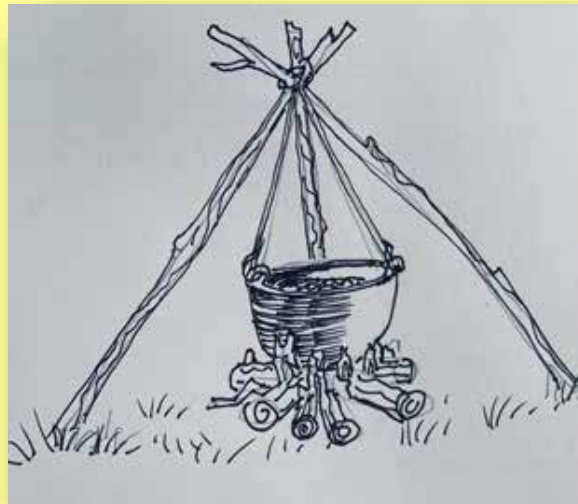
- Bulgur wheat or potatoes for a thickener.
- Any and everything that happens to be on hand, usually vegetables like corn, peppers, carrots, beans (of any kind).
- Meat: Whatever the hunter or farmer had on hand: squirrel, opossum, rabbit, quail, turkey, pork, sometimes lamb and veal.

A Modern Version: Chicken Burgoo Serves 10-12 people!

Step one: Place a whole chicken in a large Dutch oven or pot. Add 8 cups of water and ½ teaspoon of salt. Boil gently for 90 minutes. After it cools, debone, and cube the chicken. Set it aside for later. Add the following to the chicken stock in the large Dutch oven.

Add:

- 2 carrots diced
- 2 potatoes diced (1-2 cups)
- 2 ribs of celery sliced
- 1 bell pepper diced
- 1 onion diced
- 2 tomatoes diced
- 1-2 Jalapeno diced (to taste)
- 2 cups of frozen green beans or one can of green beans cut to 1-inch pieces
- 1 cup of frozen corn
- 2 tablespoon tomato paste
- hot pepper sauce to taste
- salt and pepper to taste



Cook the vegetables for about 25 minutes

- **add the cubed chicken and heat through**

Serve with cornbread, flat bread, or biscuits

WATERTRAIL/STEWARDSHIP RECIPE

Instead of buying readymade snacks for your next hike, road trip, birthday party or school trip, (especially if they are packaged in one-way plastics,) make some of your own . This is not only healthy and tasty, but the parchment paper pouch makes it environmentally friendly!

KENTUCKY WATERTRAIL MIX

Materials needed:

Wax paper- **this is environmentally friendly!**

Dinner plate (about 11 inches diameter as it fit perfectly to draw a circle on the wax paper)

Pen

Raffia (or twine to tie the wax paper pouches)

1 cup and ½ cup measuring cup

a ruler

Ingredients:

1 cup of oats

1 cup of sliced almonds

1 cup of pretzel pieces

1 cup or more of dried fruit (raisins, cranberries, mangos, pineapple, apples etc)

1 cup of shaved coconut pieces

1/2 cup of chocolate chips (any flavor) mini size if you can find them. Mix the ingredients in a large bowl.

Directions for the pouch:

Take the dinner plate and place on the way paper (the wax paper is 12 inches wide, so the plate should fit great)

Draw around the outside of the plate to make a circle, make 12 circles.

Cut the circle out.

Place a little less than ½ cup of mixture in the middle of the parchment circle (not a heaped cup as the pouch will be too full!)- this should make 11 -12 to twelve pouches!

Gather up the sides into a pouch.

Tie twine, raffia or yarn around the top.

ENJOY your Kentucky Water Trail Mix on your next road trip, hike, birthday or paddle!

Discover the Kentucky River Watershed

Through History, Science,
Art, Culture, Conservation, Recrea-
tion and Education



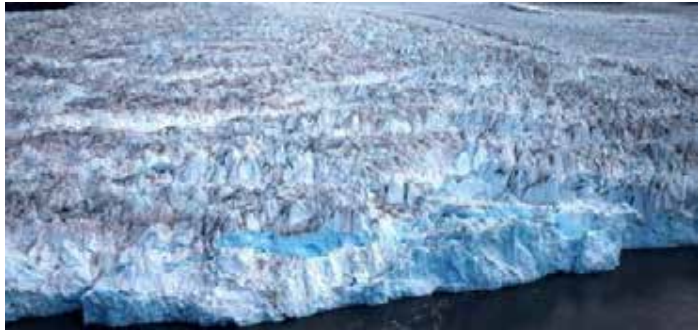
Stuck in a Glacier Chocolate Mint Cookies

Now that you know that the water in the water cycle continues to cycle through the ages, imagine that a drop of water could be frozen for thousands of years in a glacier, just waiting to be melted, so the drop can return back into the water cycle. When you make and eat these cookies see if you can visualize how it would be to be trapped in a glacier then set free!

Makes 24 cookies

Ingredients:

1 ½ cups flour
2/3 cups cocoa powder
1 teaspoon baking powder
¼ teaspoon salt
½ unsalted butter
¾ cup sugar
½ cup brown sugar
3 eggs
1 teaspoon Peppermint extract
(a half cup of fresh chopped mint leaves) 1 ½ cup of sifted powdered sugar



Directions:

- Preheat the oven to 350 degrees F
- In a large bowl mix the flour, cocoa powder, baking powder, and salt with a whisk until well blended.
- With a hand mixer, cream together the sugar and butter for about 1 minute. Add and whisk an egg in one at a time and add the fresh peppermint or peppermint extract.
- Turn the hand mixer to low and slowly add the flour mixture until a sticky dough is formed.
- Chill in the freezer for 10 minutes.
- Sift powdered sugar into a bowl and put a heaping teaspoon sized ball of dough into the powdered sugar.
- Roll the ball around in the powdered sugar until you can roll it in your palm without it sticking.
- Once you have rolled it in your palm, roll it again in the powdered sugar to add more sugar to the coating.
- Line a cookie sheet with parchment paper and place 12 coated doughballs on the cookie sheet.
- Do the same on a second cookie sheet.
- Bake both cookie sheets for 11 minutes.
- Cool the cookies for 5 minutes before you transfer them to a wire rack to cool completely!!



The heat from the cookies freed you from the glacier and you can now travel to your next stage in the water cycle!

Blackberry Cobbler

Blackberries grow wild in the Kentucky River Watershed. Cobbler is made in every grandmother's kitchen. We think the lockmaster's wife would have made cobblers for the Lockmaster and the whole family!!!

Here are my memories of making blackberry cobbler with my grandmother, Mary Goldie.

The first thing you do to make Blackberry Cobbler is to put on long pants and a long sleeve shirt. Then you rub a little kerosene on your ankles, wrists, and the back of your neck. That is to keep the chiggers off! My grandfather knew where the biggest, sweetest blackberries would grow. We would follow the path only he could see. We picked blackberries till our buckets were full.

While the blackberries were still warm from the July sun, we handed them to my grandmother to work her magic. I wanted to learn how she cooked, so she let me catch the ingredients before they hit the bowl, so I could record the measurements.

Preheat oven 400 degrees

6 cups blackberries placed into a mixing bowl

Add:

1 small tart apple- diced

1 ½ -2 cups of sugar

(depends on the sweetness of the berries)

1/4 teaspoon salt (secret ingredient)

Dissolve 3 Tablespoon of flour into 1/3 cup of water, stir into the berries

Pour berry mixture into a seasoned and buttered 12 iron skillet and heat slowly

Dough Add:

1 ½ cups of all-purpose flour

1 ½ teaspoons baking powder

½ teaspoons baking soda

1/2 teaspoon salt

1 Tablespoon sugar

1 teaspoon vanilla (secret ingredient)

8 Tablespoons cold butter- use a fork and mix it into the flour mixture. It should be crumbly.

1/2to / cups of buttermilk (add enough buttermilk to have a slightly wet dough)

Mix lightly then turn dough onto a lightly floured board. Cut into one or two-inch squares and place them on top of the warmed berries. Brush the top of the dough with melted butter and place the skillet into the preheated oven for 25-30 minutes. The top should be golden brown and the berries bubbly and thickened. Wait 20-30 minute to cool slightly. If you can!!!





Discover the Kentucky River Watershed Through the Lens of Art and Science!

Lesson Plan: Bloodroot and Rabbit

With Artist Pat Banks



Goal: The goal of this project is to teach students about their Kentucky River and the creatures large and small in the watershed. How students can protect it, why they should protect it and how they are connected to it. Students need to have an in-depth experience with/ or on the Kentucky River or creek and their backyard, in the Kentucky River Watershed! This lesson Plan will focus on the Bloodroot plant and the Rabbit. Observation, drawing skills and watercolor techniques will be the tools explored in this lesson. The artwork can be collected and added to the "project" journal. See hand out/ attachment. The art can be displayed in your school, local businesses, library, websites and around the community. Students voices and images will have a profound impact on our community, help build awareness and communicate the message of conservation, recreation, and education about the Kentucky River and how be a steward through the lens of art.

Other lesson plans are available inspired by the plants, fish and animals, first people, settlers, habitat, conservation, recreation, history, watershed, Kentucky River Water Trail and aspects of the river. Pat Banks, artist, Kentucky Riverkeeper

Create a project journal/notebook The Project Journal is a critical component to the "Discover the Kentucky River Watershed". It is a creative way to help the students see aspects of the Kentucky River and give them tools for building on, collecting, and organizing information. This is a hands-on tool to help students expand, engage, and explore all their senses. See the project journal handout.



Find your place in the Kentucky River Watershed. Print the Map and put it in your Kentucky River Project Journal/Scrapbook.

Kentucky Watershed Viewer - <https://ppopis.ky.gov/watershed/>
Kentucky Water Health Portal - <https://watermaps.ky.gov/WaterHealthPortal/>

Fresh water is the cornerstone of life on our world. Understanding our connection to it and its importance to creatures large and small and our communities is critical for life on our planet to survive and thrive!

Vocabulary:

Add these to your Project Journal!

Line , shape , color, texture, value, space (depth-perspective) watershed endangered, mammal, rabbit, grasslands, forest, ripples, rain, Kentucky, mountain, streams, furry, bloodroot, others?

Make a poem called, Haiku.

This is a traditional Japanese poem with three lines and 15 syllables.
5 syllable first line
7 syllables second line
5 syllables third line

Using some key words from your word bank create some haiku poetry!

Example:

**Still Rabbit hiding
Forest deep and mysterious
Home to great and small**

Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Introduction

The Kentucky River watershed is a wonderful place filled with a diversity of plants and animals, we have a variety of habitats for those plants and animals. We have old forests, rock cliffs, caves, grasslands, wetlands, lakes, rivers and creeks. Today we will start the study of the plant, bloodroot and a small furry mammal the rabbit.

What is a bloodroot plant? Its sounds scary! It has white blossoms with 8 petals, yellow stamens, a heart shaped leaf with 5-9 lobes. It grows in rich woodlands borders and low hillsides. It blooms February through April. The red "bloodroot" was used for paint and dye. The first people used the roots for treating rattlesnake bite and insect repellent. Pioneers used it for cough medicine with honey. But they had to be careful because the root is slightly poisonous.

What is a rabbit? Rabbits are mammals. They are very cute, they have become a symbol of spring and the mythical Easter Bunny. This is an Eastern Cottontail, it has grayish brown fur, it has a short cottony white tail, whitish feet and long ears. It thrives in brush, forests and thickets. Rabbits breed February through September. They produce litters 3-4 time per year with 1-9 young in each litter! You may find them in your backyard garden!



Kentucky Watershed River Facts

- The Kentucky River, including its upper tributaries, is approximately 420 miles long from its beginning in the mountains of eastern Kentucky and north to the Ohio River in Carrollton.
- What is a watershed? Picture a crumpled newspaper, lay it down on a flat surface and look at the "mountains" that are formed. Now think of rain falling on the mountains. Some water would flow away from an area and some of the water would flow together. The area that flows together is a watershed. The water that flows away is part of another watershed.
- There are all or part of 42 counties in the Kentucky River Basin.
- Almost one million people depend on the Kentucky River for their primary source of drinking water, agricultural production, and numerous industrial uses.
- Rabbits and bloodroot thrive in the Kentucky River Watershed. Can you list other plants, animals and insects that live in the watershed? Your backyard.
- There are many threats to the Kentucky River and the watershed. We must be good stewards! What can we do?

Lesson Plan: Bloodroot and Rabbit

With Artist Pat Banks

Student's voices and images have a profound impact on our community and can help build awareness and communicate the message of: conservation, recreation, and education about the Kentucky River, the watershed and all of the creatures great and small.

Age: Can be adapted to grades k-12. Older students can work more independently. Teachers are the classroom experts and can adapt these ideas to fit their classroom needs.

Time: 5-days 45-60 minutes per class. Plus more time for other suggested activities. Some students may need more time. This could easily be adapted to 10 days.

Process and Materials Needed for Each Student:

- Project Journal/Notebook to mount resource materials (photos), drawings, maps and techniques. You may use an artist sketchbook or if you are using a notebook use cover stock paper if you can, so the maps and drawings can be glued. See Project Journal lesson plan.
- Copy of the Illustrated Visual Art Vocabulary- handout- This is an illustrated vocabulary of the elements of art with a few additions. It connects the students with the language of art and scientific descriptions to use as tools. I have adapted it to the Bloodroot and Rabbit theme. Print a blank copy for each student so they can fill out their own Illustrated Visual Art Vocabulary.
- #2 graphite pencil, Red, Yellow, Brown and Blue colored pencils.
- Paper towels, newspaper (place this on the painting surface under the watercolor paper. It will help manage the water.), water bowls (suggestions: yogurt cups, cat food cans etc. something with a wide flat bottom) Take the time to set the materials up to avoid drips and spills. If you are right handed then the paint and water should be on the right and if left handed then the water and brush should be on the left!
- 4 sheets of Watercolor Paper – Canson or Strathmore 9"x 12" are recommended for this project. #2 Pencils and separate good eraser (white). Watercolors - Prang or Crayola are the best brands and have a clean rich pigment and the primary colors can be mixed to make clean secondary colors. Brushes- the above watercolor sets have a decent brush however a detail brush, white synthetic #2 round would be a beneficial addition. It needs to have a good point for detail. Especially for fine strokes used for fur.

Placement set up and storage for each students work. This helps manage water, spills and germs! Have the students put their name on everything!

Quick Overview of Daily Process:

- **Visual Art Vocabulary**– This will introduce students to the language and elements of art.
- **Sketch** and /or label all of the techniques and 9"X12" paintings.
- **Watercolor techniques**, color mixing and washes. Add details to the dry washes: fur, eyes and more leaves on the bloodroot.
- **Add washes** to the backgrounds. Practice on the small samples then move toward the larger drawings.
- **Add more details** to the dry backgrounds use the negative space around the rabbits and plants to add a layer of darker colors to add more depth. Complete the project journal.



Lesson Plan: Bloodroot and Rabbit with Artist Pat Banks

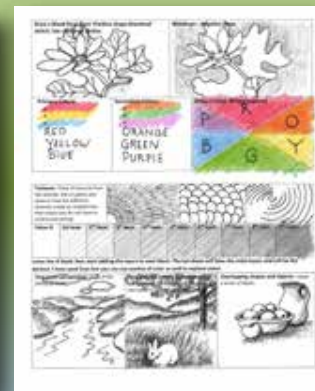
Day One: Introduction to the project and the Illustrated Visual Arts Vocabulary.

What is the Kentucky River watershed? What is a bloodroot? Where are rabbits? Have a map on the wall and a hand out. (see above) Have the students find out where they and the bloodroot and rabbit might be found on the map. Have a copy of the map for their journal! Complete the attached Illustrated Visual Arts Vocabulary. This Illustrated Visual Art vocabulary will introduce the students to the basic elements and tools of art using the creatures large and small, river and watershed elements as the reference materials. It is important to do each example with the students. Take just a minute or two for each example. A few students might want to take a few more minutes but keep them caught up and allow time later to add more detail if they want to. Especially the practice drawings of the rabbits and plant. Use the reference photos. You can also collect more reference photos and reference field guides. These will be glued/ inserted into the project journal/ scrapbook.

Set up and materials needed: The student tables need to be set up and ready to go to get maximum painting/ drawing time. Each student will need a project journal/notebook, a copy of the illustrated visual arts vocabulary, Kentucky River map, pencil and a red, blue, and yellow colored pencil. Work alongside the students to complete the Illustrated Visual Art Vocabulary. We will gear the illustrations to reflect the Kentucky River, creatures great and small using lines, shapes, colors and textures as tools. I have outlined my drawings with a maker but the students should use pencil.



Page 1. Illustrated Vocabulary of the Elements of Art and simple perspective. Use the reference drawings for the rabbits and the bloodroot.



Page 2. Paste these pages into the project journal.

Just a note! Our Kentucky River and watershed is under great stress from what we do on the land! Everything from mining, clearcutting forests, pollution from industry and our own households! Participate in a river/school/neighborhood/ creek, clean up! Tell the story! Remember if the watershed is clean and healthy for rabbits it will be good for us too!

Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Day Two :

Draw the Rabbit and Bloodroot and prep your 7- 4"x6" papers.

We will prepare the 7 small 4"x6" papers for preparation for day three, and compose and sketch the two rabbit paintings. Remember press lightly with your pencil and try not to erase your pencil marks as it will ruff up the paper! After the watercolor is dry then you can erase with a white eraser.

Set up and materials needed: Today we will need #2 pencil, Take two of your watercolor papers 9"x12" and cut to approximately 4"x6". (You should get 4 pieces from each sheet.) These are for the watercolor techniques. You will have 2-9"x12" left! They are for the larger paintings.

See samples



#1



#2



#3



#4

Draw and prep your 4"x6" papers. In the lower left corner number each paper 1-7 (You will have one left over.)

**Do not Paint yet!
You are just labeling today!
With your #2 pencil!!!!**

#1 Label the paper and leave blank spaces for the paint samples see sample.

#2 Label the paper and leave blank spaces for the paint samples see sample.

#3 Label the paper and leave blank spaces for the paint samples see sample.

#4 Leave blank till day three. We will practice brush strokes.

Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Day Two continued: Prep your 7 - 4"x6" papers and draw the Rabbit and Bloodroot

Practice your drawing skills and explore the plant and animal shapes and textures. Try not to erase your pencil marks as it will ruff up the paper! After the watercolor is dry then you can erase with a white eraser.

Set up and materials needed: Today we will need #2 pencils Take two of your watercolor papers 9"x12" and cut to approximately 4"x6". (You should get 4 pieces from each sheet.) See samples below. You will have one left over for experimenting!



#5

See the details, eye placement and fur direction!

#6

#7

Draw and prep your 4"x6" papers. In the lower left corner number each paper #1-7 (You will have one left over.)

#5 Draw the rabbit from the back. Press lightly with your pencil. Do not erase any line till the painting is finished. Look for the basic shapes that compose the rabbits. Can you see the ovals for the head and body?

#6 Draw the rabbit from the side. Add just enough detail to help you know where everything is: eye placement, direction of fur etc. See the inserts.

#7 Bloodroot- There are 8 flower peddles and the leaf wraps around the stem, The heard shaped leaf has 5- 9 lobes. The root is red! Remember to draw lightly!

Now take out your two large pieces of watercolor paper. Sketch!

It is time to build up two paintings! Get the large 9"x12" papers. Sketch rabbit #1 the vertical image and rabbit #2 the horizontal image. See the finished reference paintings. I like to have a 1 inch border around the paintings. Use your ruler to help with the straight lines. **Your compositions will be different than mine!** You might have more flowers (bloodroot) than me! Slightly different colors etc.

- Look at the reference paintings. Draw the large shapes first. Can you see the circle shapes that form the rabbits? Indicate the direction of the fur and eye placement. Do not color or shade the rabbits We will do that with paint! Draw 3-5 bloodroots around the rabbits. See reference photos for ideas.

- Imagine the rabbits in the forest and the blooming bloodroot. Use the reference paintings as your inspiration. Notice the soft light/white circle around the rabbit's eyes. Notice the direction of the fur, it follows the contours of the body. What else might you see on the forest floor? Bloodroot blooms in the spring so keep your painting consistent. Leaves? Rocks?

- We will start to paint on day three!!**



9"x12"



Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Day Three Today We Paint!!!!!!

Students will explore hands on watercolor techniques, wet on wet, drybrush and learn positive and negative shapes and brush control. We will paint 7 small paintings to explore watercolor techniques, brush handling, drawing skills and explore the plant and animal shapes and textures. Try not to erase your pencil marks as it will ruff up the paper! After the watercolor is dry then you can erase with a white eraser.



Set up and materials needed: #2 pencil, paper towels, newspaper, water bowls, watercolors - (Prang or Crayola are the best brands and have a clean rich pigment and the primary colors can be mixed to make clean secondary colors.) Brushes- the above watercolor sets have a decent brush however a detail brush, white synthetic #2 round would be a beneficial addition. It needs to have a good point for detail. Especially for fine strokes used for fur. See set up reference photo.

- Get your prepared 4"x6" papers and 9"x12" and set them aside out of your way!
- Drop water into the paint pans. This will let the paint get happy!



#1

#1 This is a color experiment! So look and see what watercolors can do! Leave a space between each group of colors. Hold your brush above the metal furf for the best balance.

- Yellow, Red and Blue-** dip your brush into clear water, then yellow, put a large swash of yellow on your paper then working very quickly rinse your brush and add red slightly into the yellow, rinse your brush then add a touch of blue on the other side of yellow. Now stop and see if you can see these primary colors blending to make the secondary colors???
- Orange with Purple and Green-** same as above, start with a wet brush then dip your brush into the orange, rinse then purple, then green. Look for some interesting darks to appear.
- Brown with Blue and Green on each side.**
- Green with Yellow and Red on each side.**
- Always rinse your brush after each color change. If your water gets dirty change it and get fresh.**

Day Three continued: These are watercolor experiments and techniques!

So look and see what watercolors can do! Leave a space between each group of



#2

#2 Natural greens are fun to mix! And they look beautiful!

Green and Yellow- Wet your brush with clear water and dip it into the yellow get your brush nice and juicy with color. Stroke it on the paper, now very quickly rinse your brush and add some green. Let the paint merge. Now in your paint tray palette mix some yellow and green and see how that works!

Green with Orange- Wet your brush with clear water and dip it into the orange get your brush nice and juicy with color. Stroke it on the paper, now very quickly rinse your brush and add some green. Let the paint merge. Now in your paint tray palette mix some yellow and green and see how that works!



#3

#3 Natural browns.

Brown with Blue. Wet your brush with clear water and dip it into the brown, get your brush nice and juicy with color. Stroke it on the paper, now very quickly rinse your brush and add some blue. Let the paint merge. Now in your paint tray palette mix some brown and blue and see how that works! See the picture of the paint tray. Brown and Blue can make some interesting and natural browns and grays. Just what your rabbit fur will need.

Brown with Yellow- repeat as above!



#4

#4 Brush strokes- 4"x6"

Your brush is a tool! It matters how you hold it! This time keep your paper dry! Notice how much control you have over the paint. Use your mixed browns (in your palette) so you can practice fur!

Wet your brush and make a tip. If you hold it straight up and press lightly you can get a vary fine line!

Make several, practice strokes see what your brush can do! Play with the pressure you put on your brush, press and release. Practice the angle you hold the brush.

Always try to stroke away from your body.

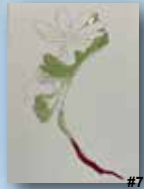
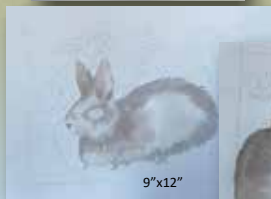
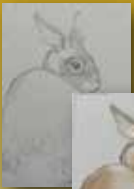
You will need to be able to make really thin lines for your details! The more you practice the more control you will have over your strokes. You have an extra 4"x6" sheet to practice more if you want to!

Day three continued: Lesson Plan: Bloodroot and Rabbit

Washes on the #5 & #6" 4"x6" and the "9x12"

Dip your brush in clear water then mix some brown and blue in your palette. Rinse your brush again then wet the whole rabbit shape with clear water, you want it shiny wet but not puddles. Now working quickly dip your brush into the brown mixture and lightly touch the paint to the rabbit. Let the paint move around a little and leave some light areas. **Do not paint the fur detail or eye yet!! Why? Because the details will bleed!!**

This is a process! Now let this dry and go to the next rabbit paintings!!!



#7-4"x6" Bloodroot. There are 8 flower peddles and the leaf wraps around the stem. The heart shaped leaf has 5- 9 lobes. The root is red! We will do this in three steps.

Mix some greens in your palette. One green with a touch of yellow and one green with a touch of orange. Now rinse your brush and add clear water to all or part of your leaf and stem. Notice that I left some light areas. I did not just color it **SOLID** green! That helps give the illusion of light. Rinse your brush and dip it into the red, now while the green stem is still wet, touch the red to the tip of the root and let it softly blend. Now let this dry.

Day three continued: Lesson Plan: Bloodroot and Rabbit

Add the details on the dried washes! Using all the techniques and tools previously explored. The students will learn how to control the watercolors, work in layers, add background and develop values and details through experimentation.

4"x6" and 9"x12" Sketches of rabbits. This is the time to practice adding the strokes for the fur, over the dried washes on the body. Add the dark pupil of the eye. Leave the area white around the eye!

4"x6" Bloodroot- Set your rabbits aside and now look at the bloodroot. Think of what we have learned. Using your detail brush dip into a color of green that is either lighter or darker than the green you have used on the other part of the leaf. Now with just a few strokes fill in the leaf. Don't do the background yet. Let the green dry!



Review:

Think of what we have discovered so far!

- We keep our sketches light and we don't press hard with the pencil!
- When we wet the object with clear water then drop in our color, two things happen. 1. The color stays where we have put the water! 2.The paint softens and merges with the water.
- When we let the wet sections dry we can then paint details on the painted area and they wont run.
- We have also learned that when two wet areas touch they will bleed.
- We have learned to analyze what wet paper will do and what dry paper will do!
- We have learned that brushes are tools and we can change what happens on the paper if we have a wet brush, press hard change the angle that the brush is held.
- We share the Kentucky River Watershed with rabbits and bloodroot and other creatures great and small.



Day four-Lesson Plan: Bloodroot and Rabbit with Artist Pat

Set up and materials needed: #2 pencil, paper towels, newspaper, water bowls, watercolors - (Prang or Crayola are the best brands and have a clean rich pigment and the primary colors can be mixed to make clean secondary colors.) Brushes- the above watercolor sets have a decent brush however a detail brush, white synthetic #2 round would be a beneficial addition. It needs to have a good point for detail. Especially for fine strokes used for fur. See set up reference photo.

- Get your prepared 4"x6" papers and 9"x11" and set them aside out of your way!
- Drop water into the paint pans. This will let the paint get happy!



#5,6&7- Practice adding background washes to the dry rabbits and bloodroot on the small paintings before you start the large paintings. The background wash is a blend of "woodsey" colors. Mix some greens and blues in your palette. Now with your wash brush (the large brush) dip your brush into clear water and wet the background of your painting. Now dip your wet brush into the paint and start working on the background. Start close to the body of the rabbit or bloodroot and work out toward the edges. Note the white petals of the bloodroot remain dry! You will leave the white of the paper for the white flowers! Work quickly. Laydown your brush strokes and leave them alone... don't go back over them. At this time if you wet your detail brush you can work the paint around and in between the fur and petals. Let the watercolor bleed and dry to create interesting textures.

You will now have three small paintings They will look very much alike but you learned different skills with each one!!!!

The real important take away is to know what happens when the paper and paint is wet and when it is dry!!!

Now let's add the first background washes to the 9"x12"!!



Day four-Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Now take a breath!

Look at your two paintings (9"x12") of the rabbit and bloodroot.

Now it is time to do the background!

Remember to keep the bloodroot (flowers) dry! Why? So they wont bleed!



Your two 9"x12" paintings have the rabbit already painted with a dry wash and the details of the fur added. I just did the Background in this example so you can see the background. What did I do?

I added a few brushstrokes of clear water to the background then very quickly while the paper was still wet I dipped my wet brush into the light greens I had mixed in my palette then just like we did in the small practice paintings I started close to the body and painted out to the edge.

Think about your fur and leave some "white outlines". See the example. You can add a few different shades of color in the background. Leave the flower petals (white) dry!!!

Then when some of your background starts to dry go to some of the shadowed areas and use a darker shade of green or brown to add shadows behind the leaves etc. See the detail samples.



Day Five-Lesson Plan: Bloodroot and Rabbit

With Artist Pat Banks



Day Five- Complete the 9"x12" Paintings!

This part of the process is about looking at your painting and analyzing what needs to be done to complete your composition.

Complete the details on each of your Rabbit paintings. Using your detail brush define the eye, the shapes of the flowers and any other adjustment you might like to make. Do you want to add more fur? Have you noticed that by having the wash on the body of the rabbit then the contrasting fine lines that it helps to create the illusion of soft fur?

It won't take much paint to finish! Compare the designs. Ask questions. Which painting is your favorite? Why? Did you learn something from each? Did you make different decisions based on what you did before? If you painted another rabbit and bloodroot do you think you would do anything differently? Remember the more you practice the better your skills will be!!!

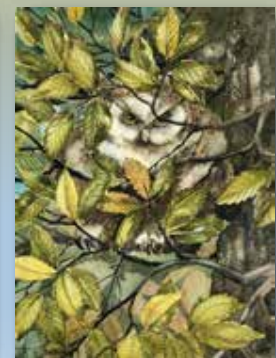
Talk to your teacher and fellow students about the process and learn from each other. Complete the Project Journal/Notebook. You have been on a creative journey so document it and present it!



Remember why we are painting this beautiful rabbit and bloodroot. We are connected to all of the creatures great and small. We need to be stewards of this beautiful place! That means being aware of what is happening in the watershed and helping to keep it clean!!! Don't forget to complete the project Journal!!!! Paste your watercolor techniques, reference photo, Kentucky River Watershed map and notes into your journal..

Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

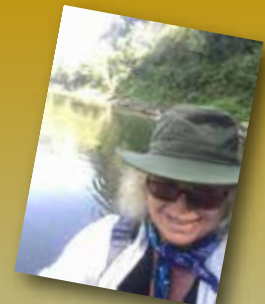
Other paintings of the creatures from the Kentucky River watershed. Notice the shifts of color and the use of texture, implied lines, and negative space.



Lesson Plan: Bloodroot and Rabbit With Artist Pat Banks

Other Resources and Activities:

- Illustrated Visual Art Vocabulary attached, Elements of Art.
- Kentucky River Watershed Watch- Local members can do water testing with students.
- KY Fish and Wildlife, Endangered Species, River and Stream Eco – Posters
- Field Trip Salado Wildlife Center, Frankfort KY
- Field trip to the closest access point to the river or creek in the watershed.
- KY River Basin KY Geological survey website
- Kentucky Arts Council, Artist in Residence. Artists can be contacted to work with teachers in the schools. This is an incredible Resource for our students and schools!
- Kentucky River Authority navigation charts.
- Kentucky River Watershed Watch.
- Other lessons plans of history of the River from volcanoes-shallow seas and to thousands of years of first people occupation to pioneers, farmers, boat captains to recreation and conservation. See the Kentucky Riverkeeper website, www.kyiverkeeper.org, chapter one, **The Geographic History of the Kentucky River Watershed!**
- Draw a Habitat in your project journal and list the common animals, birds, reptiles and aquatic life in the Kentucky River Habitat. We have endangered species in the watershed what are they (see poster from KY Fish and Wildlife)?
- Create a short story using some of the creatures from the above list. Is there a problem that needs to be solved? Is there an adventure to be had?
- Boat Ride! Get out on the water. Shaker Village has a riverboat! Sketch for your project journal.
- Visit a forest or wood. What plants and animals can you identify?
- Our river is under great stress from what we do on the land! Everything from mining, clearcutting forests, pollution from industry and our own households! Participate in a river/school/neighborhood/creek, clean up!
- Add some other words to your Word Bank: habitat, ecosystem, endangered, wetlands, mammals, aquatic life, river, creek, soil, limestone, catfish, blue heron, bats, turtles, conservation, recreation, swim, boat, fish, line, shape, color, texture and more!



About the Artist. Pat works primarily in watercolor. Her fascination with the medium, combined with her studies and travels, has given her a unique lens to interpret the world, especially eastern Kentucky, her home. The beauty of the hills, valleys and rivers inspires the expression of an artist and the concern of an environmentalist. Taking the time to walk paths in the woods and fields, float down the eternal streams, and study the "wild things" brings the realization of the fragility and preciousness of this wondrous place. Pat works from her studio in Northern Madison County. Special commissions include work for University of Kentucky Appalachian Center, St. Joseph Hospital, Louisville Zoo and many more. She has illustrated three children's books and is working on the third book in the Appalachian series for the University Press of Kentucky. She is a juried member of the Kentucky Guild of Artists and Craftsmen and a juried exhibitor with the Kentucky Arts Council, Kentucky Crafted. She is a veteran teaching artist for the Kentucky Arts Council and the Berea College Promise Neighborhood program and the Berea Learn Shops. She is a founding member of Richmond Community Galleries (Gallery on main) and is the current president. She is the Kentucky Riverkeeper.

About the Kentucky Riverkeeper. Pat is an artist, mother, grandmother, and environmentalist and is the Director or the Kentucky Riverkeeper. It is a 501(c)(3) organization. Its mission is to serve as educator and citizen-based advocate for the responsible stewardship of the Kentucky River watershed for present and future generations. As director she had a vision to build awareness of the river and foster stewardship. She called it the "big idea". She has worked with great people, organizations and agencies working on one part of the river or one problem. Many of these groups and organizations did/do not communicate or partner with each other. As an artist this did not make sense, so by building networks and partnerships, the "Big Idea" has developed into; documentaries, been accepted into the National Park Mentoring program for developing "the Kentucky River Water Trail", organize and exhibit "Shaped by Water", work by artists/activists to raise awareness of our water, enforcement actions of the clean water act and developed educational materials to use in the class room. She was appointed to the board of the Kentucky River Authority by Governor Brasher and served 10 years. The KRA is the governing body of the Kentucky River and maintains the 14 lock and dams and other properties along the river.

ACTIVITY: The Geological History of the Kentucky River Watershed.

The Counting Activity.



The PowerPoint presentation (see PowerPoint, Geological History of the Kentucky River Watershed) relates to counting along while traveling in the time machine. It refers to the length of time it takes to count to One Million. Students can do this activity, as a class project, by timing how long it will take them to count to a certain number.

CONSIDER: Is it possible to say the longer numbers at the same speed as the shorter ones? What factors must be considered? Would it take everybody the exact same time to count that far?

Note: in 2007 a man named Jeremy Harper counted to one million in 89 days, at 16 hours a day for charity. He was not in a hurry and maybe could have counted faster?

LOOK AT THESE NUMBERS:

- The earth took 4.5 billion years to form. One billion is one thousand million. Or 10 to the 9th power.
- The website, <https://www.todayifoundout.com>, states that counting to a million out loud takes about 23 days.
- On <https://www.infoplease.com> we find that counting to a billion would take 11, 574 days, 1 hour, 46 minutes, and 40 seconds counting nonstop.
- To count to a 100 million would take about 10 years (counting nonstop).
- On www.mathisfun.com we find an activity called "Count to a billion."

See if you agree by timing yourself counting:

- To 100 in 25 seconds.
- To 1000, in about 10 minutes.
- To 10,000 (ten thousand) in about 2 hours.
- To 100,000 (one hundred thousand) in about 2 days - that's hard work!
- To 1,000,000 (1 million) This would be at least a month's work.
- To 10,000,000 (10 million) This would take at least a year!
- To 100,000,000 (100 million) It would take you at least 10 years.

To get to 1 billion from 100 Million we have to multiply by 10, 10x10 years to count, so it would take about 100 years!!!!

Be reminded that counting speed, taking breaks and other factors will influence how long it takes exactly.

Summarize what your conclusion is about this activity. Can you get an absolute number? Why or why not? Write a note about this in your journal.

Scale timeline of the Geological History

Roberta Hounshell



ACTIVITY:

The Geological History of the Kentucky River Watershed

Making a Scale Timeline of the Geological History

Materials:

Tape measure

String, yarn or twine is suggested (you need a string of about 15 YARDS!!!)

Notecards to label the various stages in the timeline

Procedure: *Teachers work on the scale timeline with their students:*

Differentiation:

1. for more advanced students: As a subtopic relating to the timelines, students can discuss how we know when all this happened. We can roughly time events by using fossil evidence and radiometric testing. Students can conduct their own research.
2. For young students you might want to use the following book: "How much is a Million" by David Schwartz to help students understand the concept of one million before moving on. The book uses various examples of how big a number like one million (1,000,000) really is. (The teacher would have to obtain the book independently, however!!!!)

Calculating a string scale timeline in 1:16 scale:

Scale: 16 million years = 1 inch Scale:

1/16 inch 1million years:

An inch can be separated into 16th. If each 16th represents 1 million years, calculate how long a string would be that represents each era.

NOTE: DO NOT CUT THE STRING AT ANY SPOT! ONCE THE LENGTH OF AN ERA IS MEASURED OFF, MARK THE SPOT BY TYING A NOTE CARD TO IT WITH THE NAME AND DURATION OF THAT ERA!

a) 4,500 million years (since the origin of the earth) = 7.81 yards. Mark string at that spot and attach label: (4,500 million years = 1×4500 divided by $16 = 281$ inches = 7.81 yards)

b) As we start our time travel, about 2500 million years ago, we get 4.34 yards. Mark off string at the additional 4.34 yards after and attach label at that spot.

c) Beginning of the Paleozoic to beginning of the Mesozoic ($540 - 248 = 292$ million years)

For the Paleozoic we mark off an additional 18.25 inches. Attach label!

d) The Mesozoic was about 183 million years long. So, we need to mark the string for another 11.4 inches after the mark for the Paleozoic. Attach label!

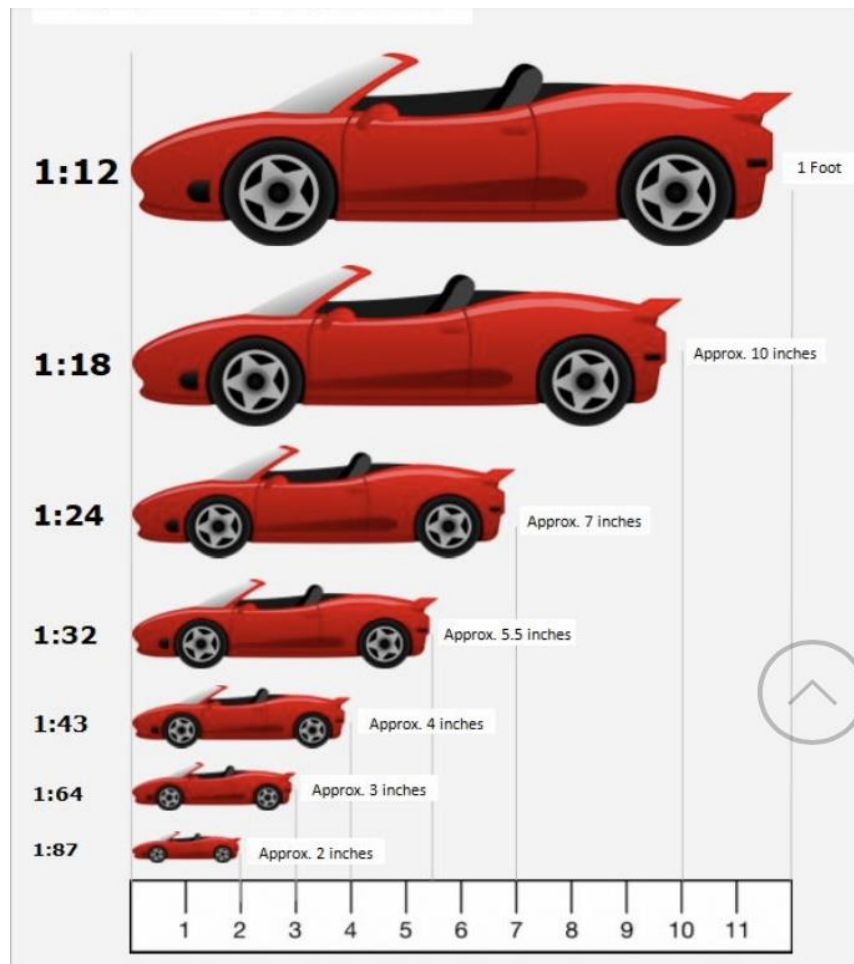
e) The Cenozoic started about 65 million years ago. So, we need to mark the string at an additional length of 4.06 inches. Attach label!

The piece since humans have been on earth is so small, that we cannot represent it in time increment of 1 million as humans appeared only about 300,000 years ago.

So, it would be less than half of a 16th of an inch!! We humans we have made such an impact on the earth, positive and negative, in such a relatively short time. Mark this short piece of string and attach label!

Suggested further exploration: Double check the math on this project. Select a different scale and calculate the needed lengths of the strings. Matchbox cars/ Hot Wheels are usually in 1:64 scale. Is a model in 1:16 scale smaller or bigger than a 1:64 scale?

DISCLAIMER: We understand that cars do not fit in with our theme of the watershed, but as most students can relate to Hot Wheel/Matchbox models, we are using the scale illustration below to help students visualize that a model in a scale with a larger number, is actually a smaller representation!



ACTIVITY: Make a Windsock to support Stewardship ideas

Roberta Hounshell

Materials:

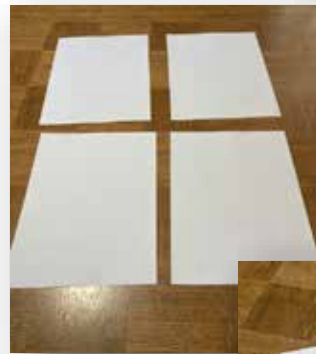
- 4 pieces of printing paper. Construction paper, or cardstock (NOTE: use light colors as you will Draw and write on it)
- Juice glass (3 inches diameter); if you use anything bigger you will need extra paper)
- 12 Pieces of 12 inch yarn/string in any color or mix colors
- 1 Piece 24 inch string to hang the windsock
- 1 Gluestick or tape or anything else that will glue paper
- Crayons or markers
- Scissors
- Pen or pencil- ruler-hole punch



Directions:

Step 1

- Take two pieces of paper(remember: light colors!)
- Put both pieces in front of you on your table or desk with the longer sides pointing to your body (hint: if you have a 12 inch ruler, the side that points to your body and the ruler should have the same length!)
- Line the ruler up with the top edge of the paper.
- Draw a line along the bottom edge of the ruler.
- Repeat for the second piece of paper.



Step 2

- Line the two papers up with the shorter sides so that the ends of the lines meet.
- Glue the two pieces together at that side.
- Fold the paper along the line of the entire paper (for stability when you hang it!)



Step 3

- Glue the flap down that you made.
- Put the paper in front of you with the glued flap touching the table and away from your body so that the edge is on top.
- Take your ruler on the bottom single line. Line your ruler up with the edge of the paper (make sure it is NOT the folded side!)
- With your pen or pencil put a mark at every inch.
- Write numbers under each mark (you should get to 20)



Step 4

- Take your hole punch and push it as far as you can up the edge of the paper, above each EVEN number (2. 4. 6. 8. 10. 12, 14, 16, 18, 20) and punch a hole. You should have 10 holes!

Step 5

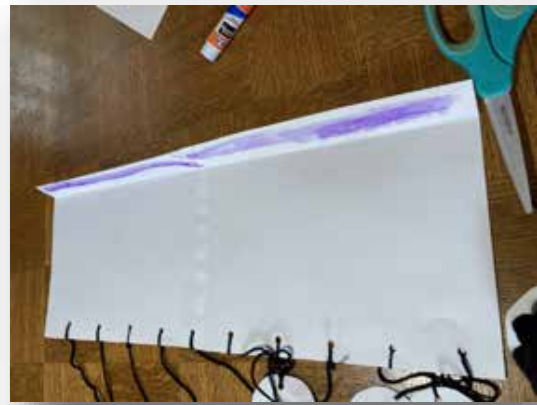
- Now take your paper, still long side across your body, folded side on top, holes on the bottom and draw a scene on your paper: the water cycle, Kentucky animals, a scene from the Kentucky River, a scene boating, fishing, etc. (NOTE: this is a Kentucky River Project so it should have something to do with any of the chapters - be creative). Make it colorful and attractive as you may want to show.

Step 6

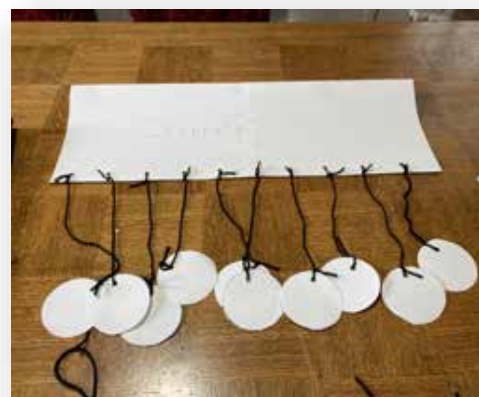
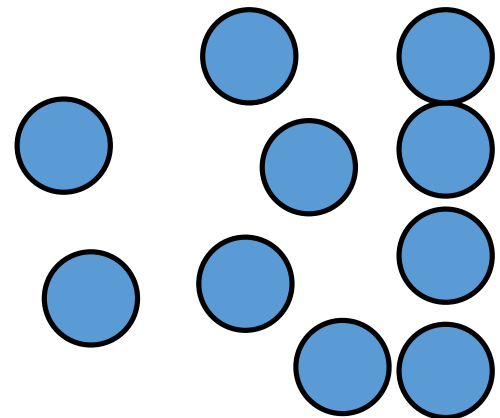
- Once your are done, take the two other papers and draw 10 circles by drawing around the 3 inch water glass (if you use a larger glass, that is fine, but you will need more paper) if you would rather draw cloud or waterdrops instead of circles, that is fine!!!
- Punch a hole in the top of each circle (or cloud, or water drop, etc).On each of the 10 pieces write 1 stewardship idea that you like a lot or that you plan to do !!!!! (each circle has 2 sides, so to put an idea on each side is a great idea also!)

Step 7

- Cut 10 pieces of yarn, 12 inches long each and 1 piece of yarn 24 inches long
- Tie a 12 inch string on each circle (or cloud or waterdrop)
- Tie each of the circles to a hole in the soon to be cylinder.

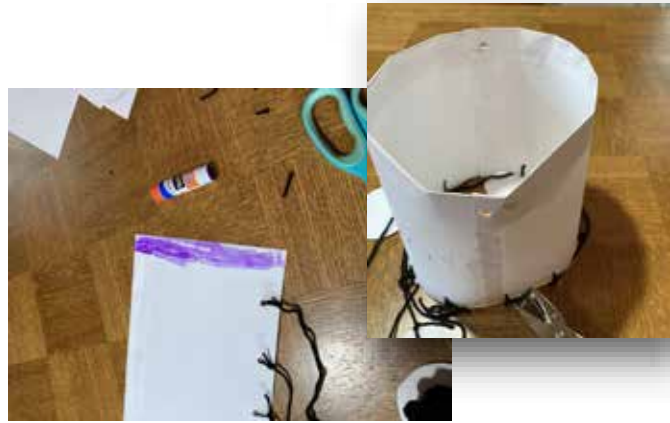


Just a few ideas, think of the principles of design and how to make a poster pop! Similar principles but in 3-d!



Glue the other short ends together so you now have a cylinder shape

- Punch two holes STRAIGHT ACROSS from each other and tie one end of the 24 inch string to one hole, and the other end of the string to the other hole.



**Your
windsock is
now ready
to hang!!!
Each wind
sock could
have it's
own color or
design to
further the
impact of
message.**



Sky Woman

Skywoman- An Origin Story, tips for success when reading out loud:

- Read the text to yourself BEFORE you read out loud and to others. That way you can practice words that might be difficult to say or to decode.

You also need to know what the text says and be ready to answer questions about what you read to the audience.

- Do not read too fast: When reading fast, you tend to mispronounce your words, cut off the ends of your words or even skip some words. Read at a pace that is comfortable for you without sounding rushed. As your voice projects into the room, the words might also sound like they run together if the pace is too fast.
- Speak clearly and project your voice: When reading aloud to an audience speak as if you are talking to persons at the back of the room. This will allow your voice to be clear and audible. The sentence structure and words might be different, so be sure the audience clearly understands.
- Use expression: When you read aloud, let your voice sound expressive and use different tones, (for example, get loud or soft when necessary.)
- Look up at your audience often when reading: Maintaining eye contact will keep your listeners interested. [NOTE: this requires that you know the text well and have practiced!!!]
- Keep your energy level up: Always try to have a high energy level and maintain it all the way to the end. This will keep your audience interested.

Skywoman- An Origin Story

The sky people lived on an island in the sky. One day a pregnant Skywoman fell through a hole created by an uprooted tree. The story says she fell for a very long time through darkness till she came to see oceans. The animals from this world were trying to understand what they were seeing. Each animal had different gifts. The birds flew into the air and gently caught her and guided her down to land on the back of a giant turtle. The otters and beavers brought mud up from the bottom of the ocean until solid earth forms and becomes Skywoman's home. She came here and accepted the gifts from the other beings with open hands and used them honorably. She shared the seeds and plants that she brought from Skyworld. Knowing she was pregnant, she understood that she wasn't building a life just for herself but for the future of her grandchildren. She became the mother of life as we know it today.

NOTE: There are many versions of Sky woman. See more versions in resources. The creation story was passed from one generation to the other through oral traditions. These teachings were not seen as rules but more of a compass and/or a guidance for life.



Discover the Kentucky River Watershed

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Habitat and the Kentucky River Watershed

Sketch, draw, photograph and paint some of the animals, plants, fish, butterflies etc. in your backyard , creek or woods!

Study of Leaves



Sketch this Maple, Tulip Poplar and Elm leaf. Compare the shapes and textures. Farmers sometimes give their rabbits elm leaves in their hutch and the rabbits will make tea from the leaves! Use pencil and or colored pencils. Look at the detail of the leaves. Compare the veins of the leaves, edges and contours.

How to make a Butterfly Garden



ACTIVITY HANDOUT : **Habitat and Watershed Chapter**

How to Make a Butterfly Garden in Kentucky

Sketch some of the flowers in your journal!

Not all butterflies like the same kind of nectar, regarding color and taste. So, if you provide a large choice of colorful food plants, your chances of getting butterflies to visit increase.

Prepare your garden soil. Remove the grasses, (set aside and compost). Loosen the soil, add nutrients such as compost and peatmoss. Plant each seed or bulb according to the directions from the gardener who shared the plants or seeds with you. If you purchased the plants, follow the directions on the package.

The following flowers are easy to find and grow in Kentucky. They will attract many species of butterflies throughout the summer season.

- | | | |
|--------------------------|----------------------------------|---------------------------|
| Aster* | Hibiscus | Phlox |
| Black-eyes Susan* | Lavendar | Pink Azelea |
| Butterfly weed* | Lilac* | Purple Cornflower* |
| Coreopsis | Marigold | Redbud |
| Daylilies* | Orange-eye Butterfly Bush | Rosemary |
| Goldenrod* | Oxeye Daisies | Verbena* |

Other ways to attract adult butterflies to your yard is to offer food plants for females.

To get specific information about what host plants certain butterflies prefer visit

<https://entomology.ca.uky.edu> , the University of Kentucky College of Agriculture, Department of Entomology

			
Aster	Black-eyed Susan	Butterfly Weed	Daylilies
			
Lilac	Goldenrod	Purple Cone Flower	Verbena

ACTIVITY: HABITAT: Predator - Prey Habitat Simulation Game.

*The purpose of this activity is to have students simulate how pollution impacts a habitat.
All animals need food, water and shelter.*

Materials needed:

an open space outside or inside (i.e. gym)- Coyotes like large areas to roam.

- Hula hoops or masking tape or any other means to mark off "habitats/safe spaces".
- Name tags with animal names (from the habitat.)
- Small paper tokens for each participant, 3 blue to signify water, 3 green to signify food.
- Procedure: mark off areas and name them, examples: Kentucky River, a pond, creek, woods, cave, as habitats for the prey. Place blue tokens around the "Kentucky River and pond area" and scatter the green tokens around the play area.
- Explain the rules:



Rules of the Game

1. One or two students get a name tag "Coyote".
2. The others get a name tag with names of animals that Coyotes eat: mice, rabbits, squirrels, frogs, etc. (Grasshoppers are important to juvenile coyotes who need to learn to stalk and pounce.)
3. The marked off spaces are "safe". This is where they raise their young and seek shelter. Each "animal" (coyotes and prey) needs to get 3 blue tokens from a water source and 3 green tokens as food during each round. For the purpose of this game they must leave their "safe" areas to get the tokens. Any prey can use any of the "safe" areas. ONLY ONE TOKEN AT A TIME!!!!
4. Let the hunt begin!!! Each round is a few minutes.

ROUND 1: This round does not have any enemies for the coyotes. They do not have to worry about natural enemies. All "animals" start their hunt for food and water. Give them a few minutes to "hunt" then get the group together. Did everyone get their three tokens, following the rules? What was their experience? Was it difficult to avoid the coyotes? Scary? Who was eaten??

ROUND2: Place tokens before starting. Give more students the role of coyotes and play again. This time there are enemies in the game for the coyote. Raccoons, foxes, and bobcats are enemies.

How was it this time? Was it difficult to go about to find their food and water?? Was there enough for everybody? How was it for the coyotes this time having to worry about enemies and to stay safe???? Did they act differently???Were there too many coyotes???

ROUND3: Place tokens back. Signify the “safe areas” as “taken” by construction, so these are no longer available. Enemies for coyotes remain in the game. Play a round. How was that experience for coyotes and prey animals??

ROUND 4: Place tokens back. Signify the “safe areas” as polluted. The prey animals are now sick and slow from the pollutants. They do not have any babies. How does this affect the experience????

After the simulation discuss the experiences. What did they learn about balance in nature? What happens if food supplies are not sufficient to survive? If their habitat is destroyed?? What happens if animals move into other habitats?? Is there enough food, water, shelter for everybody? Could this impact human habitats???

Evaluation:

Get students into small groups and have them list at least three things they learned from the simulation. They share out with the large group.

Next Steps:

Research activities kids can do to “recycle, reuse, reduce” to help minimize pollution.

SOURCES:

<https://www.epa.gov/endangered-species/learn> -more-about-threatened-and -endangered-species-
www.Sun-sentinel.com

History.com

Smithsonianmag.com

<https://greenplanet> for kids.com

<https://sciencing.com/effects-sewage-aquatic-ecosystems>

<https://sciencing.com/effects-sewage-aquatic-ecosystems>

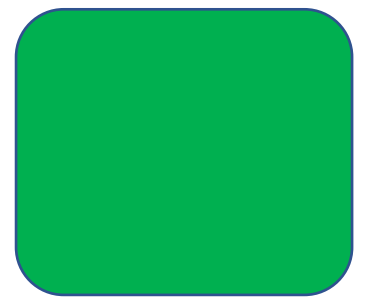
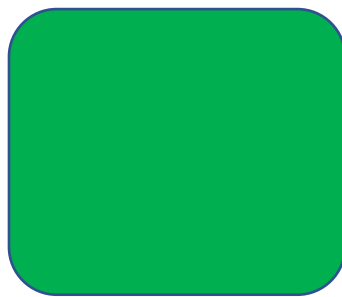
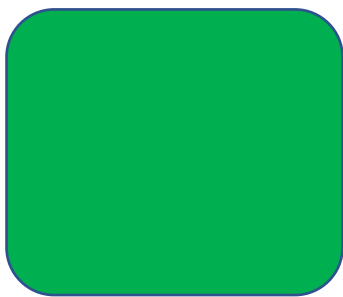
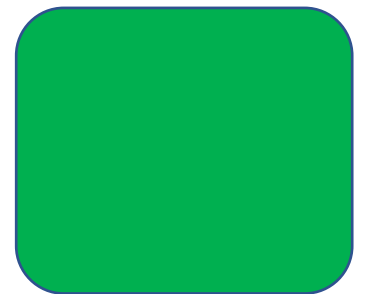
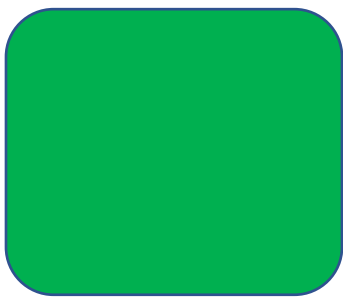
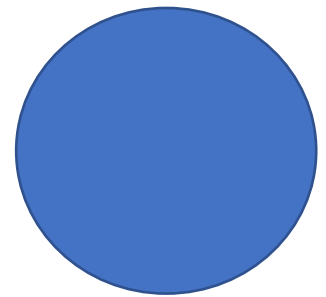
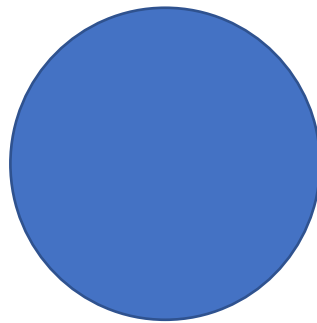
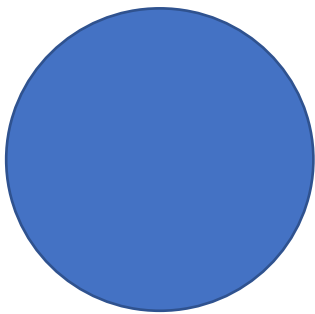
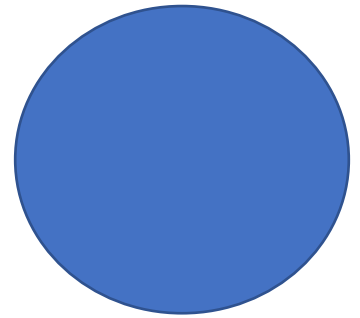
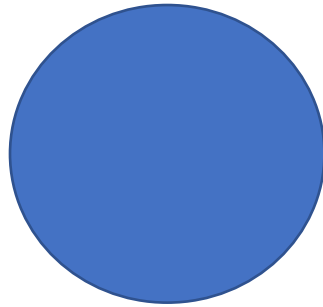
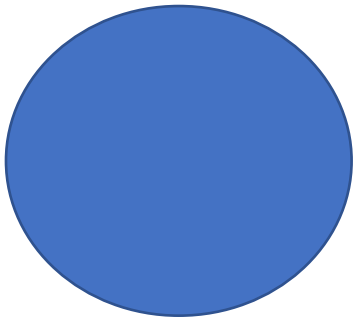
MarineBio.org

Ducksters.com

Kids.national geographic.com



Habitat Predator Prey



Activity : First People-CHEROKEE Language (Tsalagi)

Sources: https://www.lexilogos.com/english/ Cherokee_dictionary.htm

<https://polyglottclub.com>

Copy the given words in Tsalagi into your journal. Use two lines so that you have room for larger and smaller letters. Do not forget to copy the meaning and the way you pronounce the words.

Copy the words using the english alphabet and the pronunciation of the words:

ENGLISH

man
woman
dog
sun moon
water
bison
snake wolf
black fox
red fox
otter river
fish

CHEROKEE WORDS

asagaya
agehya
gitli
nvda
nvda (same as sun)
ama (like ELU-ama)
yanasi
lnada
wa ya'
lnali
tsula
lsalagi
eqoni (Eluama's otter friend)
atsadi

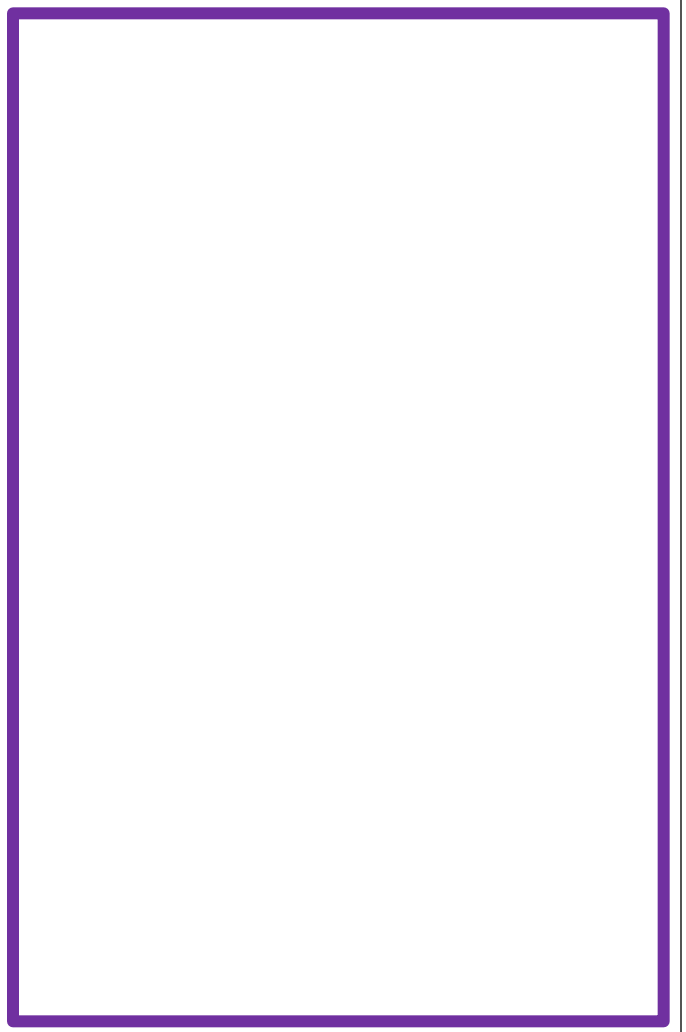


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Sketch your Version of SKYWOMAN!

Add to your journal and make a poster.

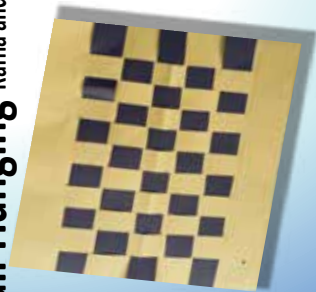
After your practice sketch, make a poster or design a bulletin board to illustrate the Skywoman story! What characters do you want to draw? When you make a poster think of your message and design. Check out "Making Your Posters POP!", it is a worksheet that will give you practice and some "tools" to help implement your ideas! Tools like how to create a center of interest. How can color help with the focal point? Does contrasting textures, shapes, and colors help? Answer some of these questions and make your poster more dynamic and interesting.



Think of this sketch as practice. Play with some ideas, and compositions. Artists call these small practice sketches, thumbnail sketches. If you can plan your design on the small space then when you transition to your larger poster board you will have worked out any problems or glitches!

Discover the Kentucky River Watershed through History, Science, Art, Culture, Conservation, Recreation and Education.

Weaving Construction Paper and Wall Hanging Raffia and Sticks



1

Weaving

The first people used many arts and craft skills to create and produce many necessary items that they might need. Walmart did not exist! Arrowheads, axes and knives were made from stone, bone and shell tools. Blankets and clothing were made from animal skins, furs and some fibers and feathers, again using hand made tools. Baskets were woven from many different plant materials from vines to strips of tree bark. Bowls and storage containers were made from gourds, wood and shells. Pottery was made from clay dug from the side of mountains, fashioned and shaped into bowls and heated, to harden the bowls and pots to cook and store their food. They would need these items to catch, grow and cook food or save, preserve and store food. Clothing, housing and ceremonies also needed special crafted items and tools! See some modern examples of woven baskets.



2

Basic Woven Construction Paper

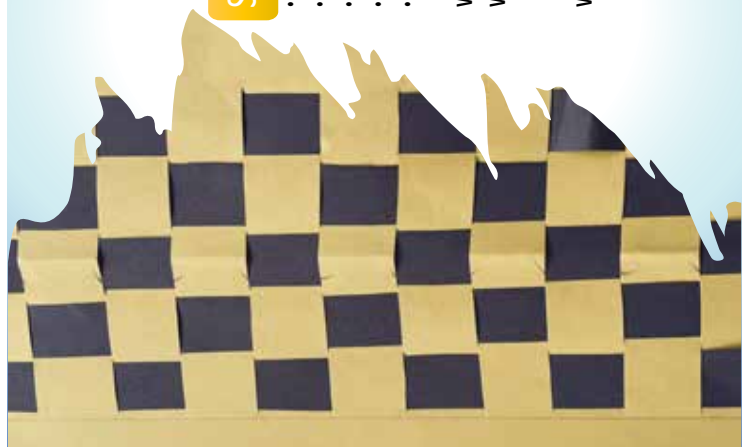
Suggested Materials List

- 9"x12" Construction paper (2) contrasting colors
- Scissors
- Glue
- Ruler
- Pencil

Weaving terms that we will be using.

Warp-The lengthwise, warp material is stationary in tension on a frame or loom. The warp frame that we are creating is the yellow construction paper.

Weft- the materials that are drawn through and inserted over and under the warp!



3

Making the Warp/Frame

- Fold one piece of your construction paper (The example is vertical and the paper color is yellow) in half.
- On the fold, measure one inch measurement all the way down the side.
- Lift your ruler and using your ruler as a straight edge, draw a line from top to bottom.



4



With the folded construction paper in your hand make 10 cuts starting at the fold where you have marked the inches and cutting to the straight line. **STOP** at the line!!! Now open it up. You have created the **warp**/frame for your weaving project!

5

Making the Weft (strips)

- These are the strips we cut from the (brown paper) that are drawn through and inserted over and under the warp! This will make enough strips for two warps. (2 projects)
- At the top of your vertical paper measure 1 inch increments.
- At the bottom of the paper make another series of one inch increments.
- Using your straight edge draw a line for each one inch strip.
- Now using your scissors cut 10 strips. You will only use 5 for this project-



6

Now Weave!

- **Weft-** (the brown strips that you just cut.) The materials that are drawn through and inserted over and under the warp! (Yellow)
- With your first strip start weaving it over and under all the way across your warp (the yellow).
- Your next row start your strip under the warp. It is the opposite of your first strip. Take your time.



7



Put a little spot of glue under each strip on both side! Now look at your creation!! Think of how you might change it. You can use other color combinations. You could make your strips narrower that would give a different look and texture. How can you use this? It could be a wall hanging, book cover, placemat etc!

8

Create a wall hanging using a natural twig frame-loom and raffia.

Weaving terms that we will be using.

Loom- stationary frame to wrap the warp materials.

Warp- The lengthwise, warp material is stationary in tension on a frame or loom. The warp frame that we are creating is the yellow construction paper.

Weft- the materials that are drawn through and inserted over and under the warp!

9



Materials

- Raffia ribbon, recycled cloth and even plastic bags repurposed for this project or other natural materials.
- Branches or twigs cut to length – this project we used 10" twigs
- Warp- Cut 80" of raffia (or other material)
- Weft- Cut ten 10" strips of raffia.
- Scissors
- Glue

10



- Build the loom for your warp material.
- Glue the branches together and also tie the corners together with the raffia.
- Let the glue dry.



11

Tie one end of your 80" warp raffia to the top of your loom. Now take raffia and loop the raffia top to bottom till you have used all of the 80" inches (tie it off) this is now your warp.

Weft- Now start weaving your 10-inch, short raffia (or what ever your materials are) weft strips. Draw through and insert over and under the warp! Now make the next weft under and over. Keep alternating the pattern till you have used your ten strips.



12

Masks of the Seven Clans of the Cherokee

Clanship is obtained through the mothers line. Cherokee society is historically a matriarchal society. Each clan had certain important responsibilities and skills that they brought to the tribe for their survival. Masks were made from: vines, gourds, fur, wood, clay, bark, hornets nests, feathers, horns, feathers and other natural materials.



Wolf Clan

The Wolf Clan is reported to be the largest clan. During times of war, the war chief would come from this clan. Wolves are known as protectors.

Draw your version of the Wolf mask.



Blue Clan

The Blue Clan is historically where the medicine for children was administered. They used a medicine that was usually painted on the child, the medicine was blue.

Draw your version of the Blue mask.



Deer Clan

Deer Clan were known as fast runners. They hunted game but they respected and cared for the animals. They were also known as messengers from people to people or tribe to tribe.

Draw your version of the Deer mask.



Long Hair Clan

The Long Hair clan was the clan where the peace chief came from. Prisoners of war, orphans of other tribes and others with no tribe were often adopted into this clan.

Draw your version of the Long Hair mask.



Paint Clan

The Paint clan were known as the medicine people. Many of their medicines were painted on, that is where their name comes from.

Draw your version of the Paint mask.



Bird Clan

The Bird Clan people were known as messengers between earth and heaven (or the creator) These members had responsibilities the care of the birds. This clan was the only ones allowed to carry eagle feathers.

Draw your version of the Bird mask.



Wild Potato Clan

The Wild Potato Clan were known to be the keepers of the land and gatherers of the gifts from nature.

Draw your version of the Wild potato mask.

The First People

A First People Story as told by, Cherokee Storyteller, Freeman Owle Tips for success when reading out loud:

- Read the text to yourself BEFORE you read out loud and to others. That way you can practice words that might be difficult to say or to decode.
- You also need to know what the text says and be ready to answer questions about what you read to the audience.
- Do not read too fast: When reading fast, you tend to mispronounce your words, cut off the ends of your words and may skip some words. Read at a pace that is comfortable for you to read without sounding rushed. As your voice projects into the room, the words might also sound like they run together if the pace is too fast.
- Speak clearly and project your voice: When reading aloud to an audience speak as if you are talking to people at the back of the room. This will allow your voice to be clear and audible. The sentence structure and words might be different, so be sure the audience clearly understands.
- Use expression: When you read aloud, let your voice sound expressive and use different tones. For example, get loud or soft when necessary. [NOTE: Mr. Owle is a renowned Cherokee storyteller. He is very passionate about rivers and water in general. In the chapter this story was excerpted from (see reference below), it is shared that Cherokee Indians and their rivers cannot be separated. Protecting the river is vital to the tribe's spiritual and physical health). Capture his passion in the way you read. This will keep your audience spell bound!
- Look up at your audience often when reading: Look up at your audience often while reading. Maintaining eye contact will keep your listeners interested. [NOTE: this requires that you know the text well and have practiced!!!]
- Keep your energy level up: Always try to have a high energy level and maintain it all the way to the end of the reading. This will keep your audience interested.



Story as told by FREEMAN OWLE:

First people Story

When the first man and first woman lived at Shining Rock, everything was available and easy to procure, and the Cherokee had all the food they could eat. The hunter went every day for meat and said to his son, 'Don't follow me.' But the child did, and while his father was washing the deer he had killed, a drop of blood dropped into the water and became a child -a wild child- who played with the son, and one day said to the son, 'If something happens to your father, we'll starve to death. Where does he get his game? We should follow him.' So, the two boys did, to a cave. Every day, the hunter rolled away the stone at the entrance to the cave, and an animal would sprint out. The hunter would kill the animal, then roll the stone back over the entrance. 'We can do that, too', said the wild child to the son. And so, they followed the hunter to the cave, and watched as he rolled away the stone and rolled it back. While he was washing his kill, the children rolled away the stone. A deer ran out of the cave and they shot it with their arrows, but missed. Every type of game on the earth continued to run from the cave, and the boys used every arrow without killing a single animal. They tried to roll the stone back, but it would not budge. From that day forward, people have had to hunt for food."

Questions the audience might have:

- What is the moral of the story? **Answer:** Violating cultural norms means bad things happen. The children were supposed to obey the father, but the son did not obey, so there was a consequence. The child followed his father when he had said not to do that. The first consequence was that a drop of blood fell into the river which created the “wild child”, which led the son to further disobedience.
- Why was it so bad that a drop of blood fell into the river? **Answer:** The Cherokee understood that to stay physically and spiritually healthy, the rivers, which they used for many things vital to the tribe, needed to be kept clean and sanitary.
- What other purpose did stories about rivers have as they were told to children? **Answer:** Children learned by watching their elders and by listening to the stories they told. River stories (and other stories) served as warnings and teachings. Children also needed to learn that the river could be dangerous and they must respect its power.

Sources:

<https://outstate.com/chokeee-stories-tell> of waters-wisdom.

Article by Susan Stafford Kelly: “Cherokee Stories Tell of Water’s Wisdom”.

<https://www.amazingreadersbookclub.com-5Tips for Reading Aloud to an audience>

<https://www.nypl.org>



CLANS OF THE CHEROKEE

Make a mask or poster and practice with the HANDOU



The Eastern Band of the Cherokee Indians consists of over 15,000 enrolled members and has a legacy that reflects a people who remain strong. Cherokees have always held their robust values and deeply rooted principles. Cherokee values teach us to continually respect our earth and one another.

The Cherokee Seven Clans are a traditional social organization of Cherokee society. Traditionalists still observe clan customs regarding marriage and certain social events. Clanship is passed through the mother. Women were considered the head of household. With the home and children belonging to her should she separate from her husband. It is important to know what clan one belongs to for many reasons. For Traditionalist it is forbidden to marry within one's clan because clan members are considered brothers and sisters. Knowledge of clan membership is also important when seeking spiritual guidance and in medicine ceremonies.

Activities

Learn about the seven clans and design a mask (paper mask or paper mache mask) that fits best to characteristics of the members:

Work on the HANDOUT -

The Cherokee Seven Clans:

Blue (A NI SA HO NI) -Historically, this clan made medicine from a blue-colored plant to keep the children well. They were also known as the Panther or Wild Cat Clan.

Long Hair (A NI GI LO HI) -Also known as the Twister, Hair Hanging Down or Wind Clan. They wore elaborate hairdos and walked with a proud, twisting gait. Clan members are regarded as peacemakers; and Peace Chiefs were often from this clan. Prisoners of war, orphans and others with no Cherokee tribe were often adopted into this clan. Thus a common interpretation of the name "Strangers".

Bird (A NI TSI S KWA) -historically known as messengers. The belief that birds are messengers between earth and heaven, or the People and Creator, gave the members of this clan the responsibility of caring for the birds. They were skilled in using blow guns and snares in hunting birds.

Paint (A NI WO DI) -historically known as prominent healers. Medicine was often "painted" on a patient after harvesting, mixing and performing other aspects of the ceremony. Clan members made red paint and prepared teas for vapor therapy specific to each ailment.

Deer (A NI KA WI) -historically known as fast runners and hunters. Even though they hunted game for food, they respected and cared for the animals while they were living among them. They were also known as messengers on an earthly level, delivering messages from village to village, or person to person.

Wild Potato (A NI GA TO GE WI) -historically members of this clan were known to be "keepers of the land" and gatherers of the wild potato in swamps and streams. They were known as the Bear, Raccoon, or Blind Savannah Clan.

Wolf (A NI WA YAH) -the largest and most prominent clan throughout time. During the time of the Peace Chief and War Chief government setting, the War Chief came from this clan. Wolves are known as protectors. Only members from this clan were allowed to kill a wolf.

Sources

<https://visitcherokeec.com/play/culture/the-people/>

"The Cherokee Past and Present" An Authentic Guide To the Cherokee People by J.Ed Sharpe

Mooney, James. Myth of the Cherokee. Mineola, NY: Dover Publications, 1995:507-548. Cherokee Nation Cultural Resource Center Cherokee, Graphic Arts Center Publishing

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Cherokee Words



Use the references below to write words in Cherokee. Note the different shapes of some of the letters. These letters will have different sounds associated with them too. See the Cherokee Syllabary for more references and practice.

DLTGA - love (adageyud)
tsunadalelvdatvniidod
dθLδ7LdhVJ - zox

oJAvo - insect (sgoyi)
GWY - Otter (isalagi)
DCJ - fish (atsadi)

ONS - white (unega)
HAHT - blue (sakonige)
TθL - snake (inada)

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Make a Crazy Quilt Pattern from Scrap Paper

Make a Crazy Quilt pattern from paper scraps!



Pioneer women were very creative and frugal. There were no Wal-marts or Targets to buy quilts, blankets and other necessities. They needed to make or trade for everything they needed! Quilts are one of those necessities that the families needed. As practical people they didn't throw away old clothes or materials. They would cut out the best unworn parts and sew them into quilts. They came up with incredible patterns like the Log Cabin, Bear Claw, Broken Dishes, Double Nine Blocks, and hundreds more. We are going to create a Crazy quilt pattern. No two quilts will be the same! Each design can focus on pattern, complementary colors, cool colors, warm colors, analogous colors, monochromatic and more. **Quilts were born from necessity but were quickly elevated to an art form to become treasured for generations to come!**

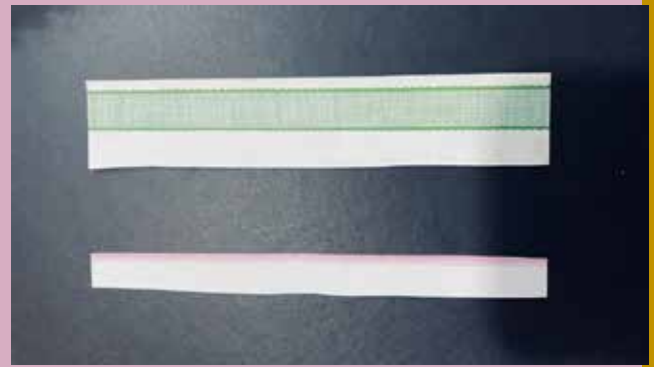


Materials:

The sample is cut from wall paper samples, but you can use any paper, construction paper, magazine covers, comic strips or fabrics.

- Radom paper cuts
- Scissors
- Glue
- Construction Paper to mount your design, 9"x12"

- Play with your paper scraps. Arrange them in a pleasing design. Cut four straight pieces of your paper to frame/ boarder your design.
- Cut two 12" and two 9" boarder strips 1/2" wide.
- When you are ready, start gluing your paper samples down.
- Stay inside your 9"x 12" construction paper. Base. Cut off any over hanging "quilt" pieces.
- Glue your boarder last.

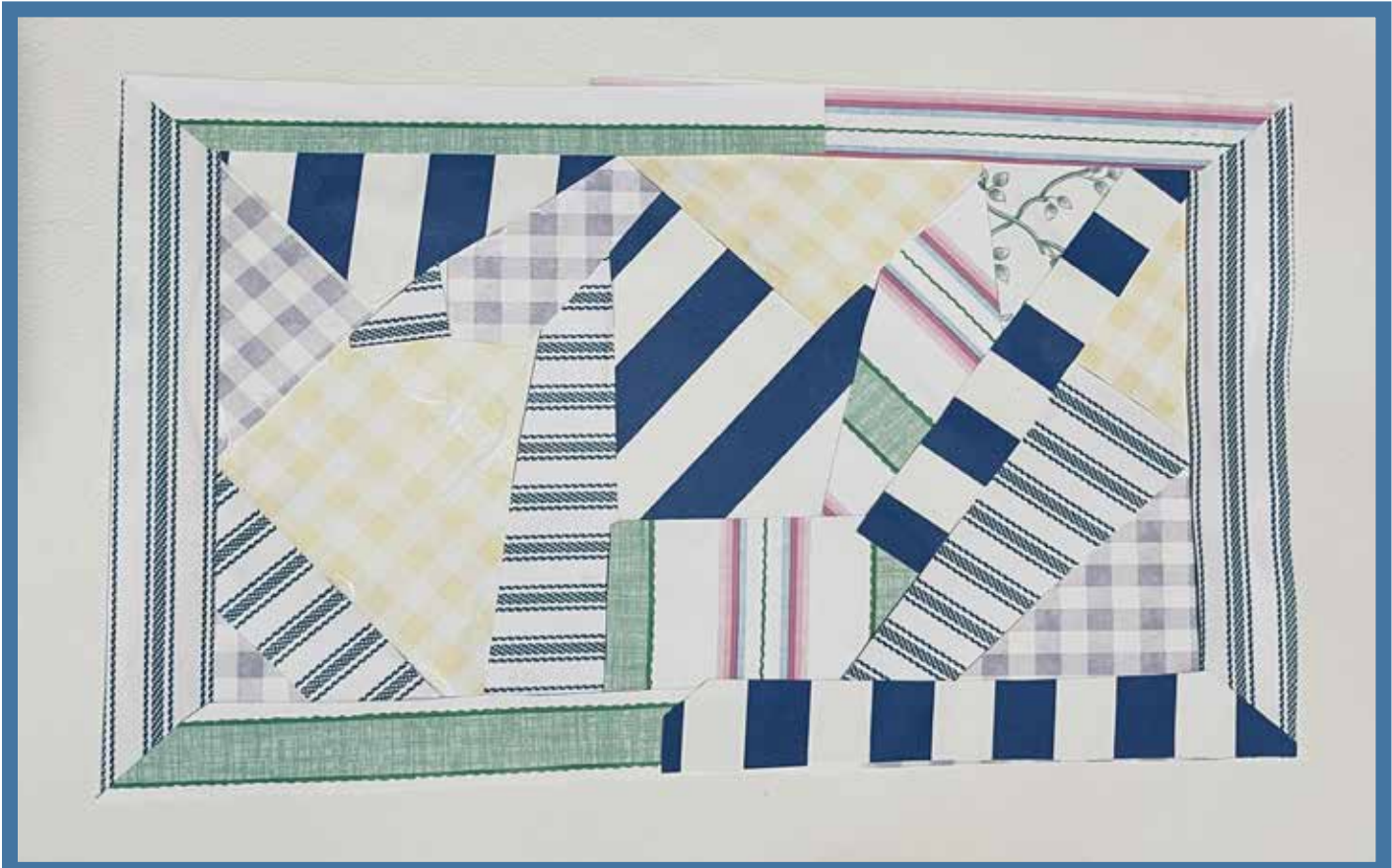


What creative name would you name your quilt?

What would you name the sample quilt?

Broken Water?

Water Ripples?



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The Legend of the Three Sisters

There are several legends surrounding the Three Sisters. Almost every Native nation seems to have its own. This is the version of the legend of the Haudenosaunee (Iroquois). The three sisters represent corn, beans, and squash. These vegetables planted together influence and enrich each other's growing environment and development. This story, as with other native stories, were meant to teach, inform and guide the people about their history, cultural morals and values.

Very long ago, there were three sisters who lived in a field. The youngest was so small she could not yet walk; she crawled around the ground, dressed in green. (squash) The middle sister (bean) wore a bright yellow dress and darted back and forth across the field. The eldest sister (corn) stood tall and straight, and her body bent with the wind. She had long yellow hair and wore a green shawl. The three sisters loved one another very much and could not imagine living without the others.

One day a little Indian boy came to the field. He was very handsome and knew the ways of the land. He could talk with the birds and the animals and was straight and fearless. The three sisters were very interested in this boy as they watched him use his stone knife to carve a bowl or hunt with his bow and arrow.

Late in the summer of the boy's first visit to the field, the youngest of the three sisters disappeared. She was the one who could only creep along the ground; she could not even stand unless there was a stick she could cling to. But she was gone, and the other two sisters mourned her until the fall.

The Indian boy returned to the field to gather reeds that grew at the edge of a small stream. He cut the reeds to make arrow shafts. The two remaining sisters again watched him, fascinated. That night, the second sister disappeared, the one who always wandered hither and yon.

Now there was only one sister left, the tall and straight sister. She did not bow her head in sorrow, though she mourned deeply and thought she could not live in the field alone without her sisters. As the days grew shorter and colder, her green shawl began to lose its color and her yellow hair became dry and tangled. Night and day she sighed for her sisters, but her voice was low like the wind, and no one heard her.

One day in the harvest season, the little Indian boy heard the third sister crying, and he felt sorry for her. Her took he in his arms and carried her to his home, and there a delightful surprise awaited her. Her sisters were there in the lodge, safe and very glad to be reunited. They explained that they had been curious about the little Indian boy and had followed him home, and they had decided to stay because winter was coming, and his home was warm and comfortable.

The sisters also were making themselves useful to the boy and his family. The youngest, now all grown up, kept the dinner pot full, while the second sister, still in her yellow dress, dried herself on the shelf so she could fill the dinner pot later in the winter. The eldest sister was so pleased to be with the sisters again and so impressed with the help they gave the boy, that she too began drying herself so the family would have meals to use as the winter went on.

And from that day to this, the three sisters were never separated again.



Sources:

<https://www.oneidaindiannation.com/the-legend-of-the-three-sisters/>

"The Three Sisters-Exploring an Iroquois Garden," Cornell Cooperative Extension, 1997

<https://www.ourstate.com/supper-with-the-cherokee-trio-corn-beans-and-squash/>

"A is for Appalachia," Linda Pack, author, Pat Banks, illustrator, University Press of Kentucky, Lexington KY.

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STEREOTYPES associated with Native Americans

Sources:

<http://native-language.or/headdresses.htm>

<https://www.cherokee.org>

Personal account by Susan Mullins, Mohawk, Iroquois Nation

Do all Indians Live in Tipis? Questions and Answers from the National Museum of the American Indian, Smithsonian Books, Library of Congress. We all know the way Indians are portrayed in TV movies:

1. Is it true that Native Americans live in Teepees (or tipis or tepees)?

Teepees are the traditional homes of Plains Indians, but in other areas Native people lived in many kinds of dwellings. Whether a tribe lived in a buffalo hide tepee, an adobe hogan (dwellings made of adobe and supported by rock or timbers), or a birch bark wigwam, the home structure, and materials were suited to each tribe's needs and environment. The Iroquois built long houses from logs, saplings, and bark, all of which were abundant in their forested environment. Some Navajo people still live in hogans because the structure is well adapted to the desert with the adobe absorbing the sun's heat and such keeping them cool inside. The Great Plains once sustained millions of bison and the Plains Indians depended almost entirely on the bison for their needs, including shelter. Their larger tepees might have been made of as many as 18 hides.

So, would you have seen the Indians living in Kentucky in tepees (or tipis or tepees)? One of the largest groups living in Kentucky were the Cherokee. They were not primarily nomadic hunters and gatherers (who needed to move their dwellings as they moved around). They were farmers and hunters. They, the Cherokee had permanent structures called wattle and daub homes, with a frame made from tree logs. They were covered in mud and grass to fill the walls.

Actually there were more kinds of dwellings Native Americans lived in such as grass houses, Igloos, and Pueblos (adobe houses), Wigwams, Longhouses, Plank-houses. Housing was adjusted to climate and lifestyle demands.

2. Did Native Americans really use smoke signals?

Yes, some Native people on the Great Plains and in the Southwest used smoke signals hundreds of years ago. For example, the Navajo and Apache transmitted smoke signals as a military tactic

Steriotypes continued:

to warn of the approach of enemies. Many believe that an entire language was built around the use of smoke signals. Native peoples **DID NOT** spell entire words and neither did all tribes use smoke signals to communicate. Mrs. Sue Mullins, who is a native Mohawk from the Iroquois Nation, shared that hunters would go out in small groups. When they had made a kill, they would use smoke signals to alert the rest of the hunters, who had stayed behind, that their help would be needed and in what location.

3. Did all chiefs wear the long feather headdresses?

That kind of headdress, called war bonnets are commonly known from TV shows and Westerns and are the best-known headdress today. However, this kind of headdress was only worn by less than a dozen Indian tribes in the Great Plains. The headdress most widely used was the roach headdress (including Cherokee). These were made of stiff animal hair, like porcupine hair, moose hair, or deer's tail hair that was attached to a bone hair ornament or a leather base. It stood straight up from the head. Sometimes it was attached to the man's own hair. Mohawk and Mohican tribes used this headdress commonly, such the name Mohawk for the hairstyle of the same name known today. Other headdress used were basket hats and feather headbands by a few tribes in the northern Woodlands, which was usually made from woven or beaded deerskin strip with tribal designs. Usually an eagle, turkey hawk, egret, or crane feather was tucked through the back. This headdress was not worn for war but for decorative purposes. Another headdress worn for war, was the buffalo horn headdress, mostly by Plains Indian warriors, such as the Sioux tribe.

Another headdress that was worn as a formal head covering with great symbolic importance. Were called Otter fur turbans or otter- skin caps). A chief and his descendants would often wear one with lots of decoration with an eagle feather tucked in the back of the cap.

4. Did Native Americans really smoke peace pipes?

Pipes and tobacco are sacred to Native peoples throughout North America. Pipes are the instrument through which smoke and prayers are carried to the spirits. Each tribe has its own ceremonies and occasions for using pipes and tobacco.

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ACROSTIC POEM: An acrostic poem is an accessible form of poetry that allows you to choose a topic and then build your poem around it. Acrostic poems generally have the following characteristics:

1. The topic word is written from top to bottom
2. The lines of poem relate to the topic word
3. The letters of topic can be:
 - a. The first letter of the line (**MOST COMMON!**)
 - b. Placed in the middle of the word/line.
 - c. It can be the start of the last word of the line.
4. Lines can be single words, phrases, or full sentences.
5. This poem usually doesn't rhyme.

Topic word: **RIVER**

Placed at the beginning of the last word of the line

Sitting on the bank, watching the **R**ain

Watching the fish diving **I**n

Seeing the otters playing **V**ehemently

While the water is flowing **E**verlasting

And it all started with the falling **R**ain

Topic word: **ACROSTIC**

This word is placed in the middle of the line.

Writing **A** poem?

PiCk a topic of your choice.

You can **wRite** about anything.

Let **yOur** imagination soar.

What'**S** the right word?

Writing your **T**houghts on paper.

Nothing is **I**mpossible.

Be **C**reative!

Choose your RIVER topic words!



The letters do not have to be spaced like in the examples. You could use a different color or just bold! Just think RIVER thoughts!

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Build a Flat Boat Model

Build a flat boat model. Sounds easy!!! But think about the first settlers, their tools and equipment. They might have an axe, maybe a saw and lots of labor. They would have to find the right trees. The trees would need to be as straight as possible. The Trees would have to be cut down and dragged to the beach. Have you tried lifting a 10 foot long log, 10 inches (or more) wide? The boat builders would need rope or sturdy vines (not poison ivy vines!!!) to tie the logs to-gether. Maybe it was not so easy? While it wasn't easy it was very useful. The flat boats made it possible to travel the shallow river with families, supplies and or take products to market. There were no roads. The river was the main access to the heart of the Kentucky River Watershed. Native people have used the river for over 1,2000 years!



To build your flat boat model you will need to gather your materials.

- Raffia or string
- Pruners
- Cut sticks (24-30) try to get them as straight as possible. Cut them to 10-12 inches, that will work great.
- Scissors
- Glue



Set up your work space:

A folded newspaper makes a great work area.

Take the time to look at the sticks, the colors and textures. Trim to the same length, approx. 10-12 inches.

It is fun and challenging to work with natural materials. They have a certain character.





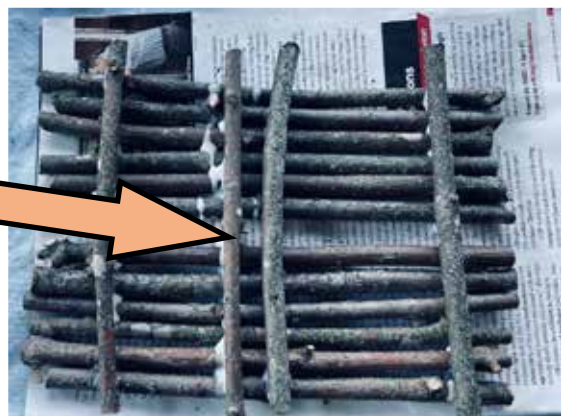
Make a simple frame. Tie and glue the corners for stability.
Choose the rest of your sticks and lay out the pattern.
See the double row of sticks in the center on the bottom?
Leave a space for the mast (pole for the small sail.) right in the center.



Work with the natural curves of the sticks, try different positions for the best placement for the sticks. Glue and tie the sticks into place.



Here is the pattern for the sticks.
See the space left in the center for the mast?



The mast (center pole) should not be too long because it might upset the balance of your flatboat.) Can you see the cross piece that the sail is tied to?



Attach the cross piece, glue and tie. Now insert the mast into the center pole. Glue and tie into place. Attach (tie) a sail to the mast. We used a brown piece of fabric cut into a triangle. The boatmen would have used a piece of canvas.

A boatman would also have a long pole to push and guide the flatboat down the river. Sometimes the boat builder would add a rudder, that helped guide/steer the flat boat. If the flat boat was going upstream (against the current) they might have used an ox, horse, or mule to pull the flat boat.

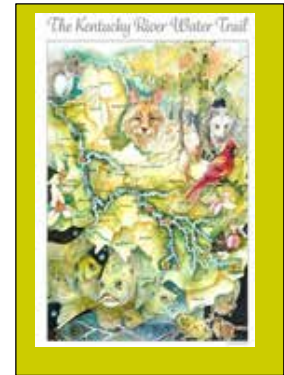


Take your flat boat for a float!
Maybe tie a string to the boat it so it doesn't float away?
Can you see the current?



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Create a Puzzle from the Kentucky Water Trail poster!

**Look at the map. What area do you live in?
What creatures and plants can you identify?**

ACTIVITY: WATERTRAIL PUZZLE

Note: This is an original artwork by Kentucky Watercolor Artist, Pat Banks

Materials:

- Print blank puzzle grid- see in resources.
- Print sheet with puzzle pieces.
- One piece of construction paper (or you can glue the grid into your journal!)
- Scissors
- Glue stick

Directions:

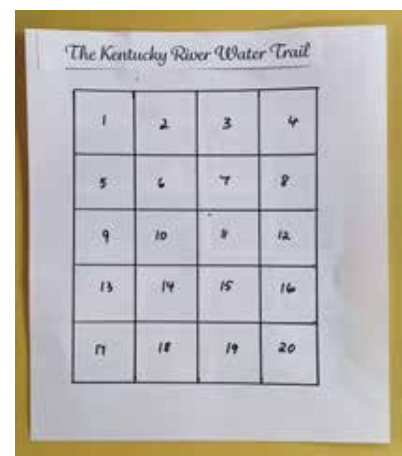
1. Download the picture of the puzzle pieces and the blank puzzle grid.
2. Print both and glue the puzzle grid to a piece of construction paper or glue it directly into your journal.
3. Cut out the 20 puzzle pieces (numbered 1-20).
4. Glue the puzzle pieces to the corresponding spots on the puzzle grid.
5. **BONUS:**
How many animals can you locate and name? Can you name all ten?



Cut out the 20 puzzle pieces!

**The Grid and puzzle pieces are found on
the following page.**

Animals found on the puzzle: several fish (bluegill), opossum, frog, butterfly, wildcat, bat, rat, squirrel, cardinals male and female.



Paste this grid onto construction paper or directly into your journal! Paste the puzzle pieces to the proper space on the grid.

The Kentucky River Water Trail

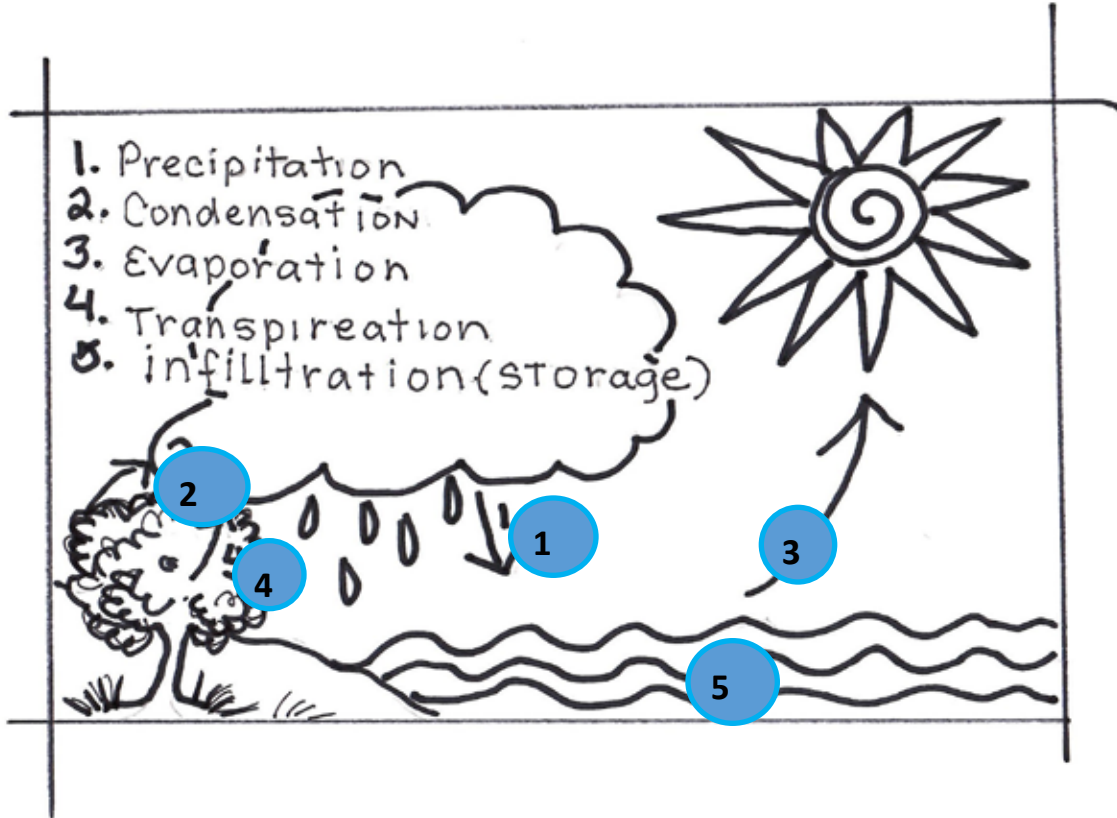
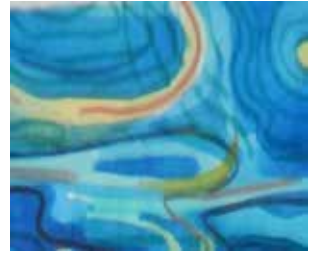
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20



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and Education while Cultivating Stewardship Practices

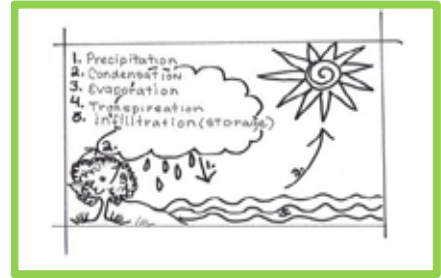
Simple Water Cycle



Draw and label the water cycle and color with crayon or colored pencils.

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ACTIVITY: Water Cycle Terrarium

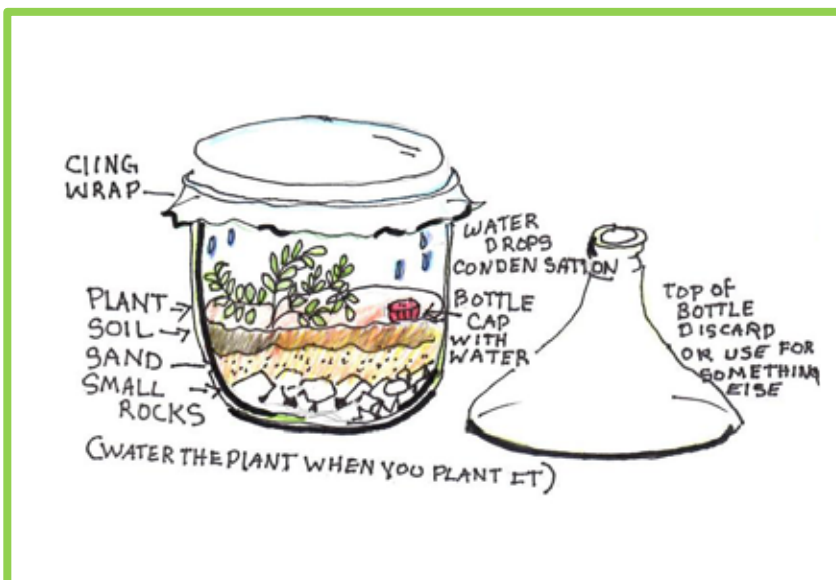
This simple terrarium and model demonstrates the water cycle with your own small garden in a bottle. The plants produce the water vapor which goes into the air. It is trapped in the container, so that vapor condenses and runs down the sides of the container. Until it goes back into the soil. The water is used by the plants again and the cycle starts over. There is virtually no water lost through evaporation as the container is sealed with the Cling Wrap!

Materials:

- Use a glass jar or an empty 2 Liter soft drink bottle (have an adult help you cut the bottle just under the rounded part of the top so you have a large opening- see drawing)
- KEEP THE BOTTLE CAP to add a small lake in your terrarium!
- Small rocks
- Sand
- Soil
- Small green plants (you know the size of the bottom of your drink bottle, so pick the plant so it needs about $\frac{1}{2}$ of the space)
- Water
- Cling Wrap, rubber band.

Procedure:

1. Covering the bottom of the container with small rocks.
2. Add 1-2 inches of sand on top of the rocks.
 - Add 2-3 inches of soil on top of sand.
 - Now plant the small plant on one side of the jar. Give the plant a drink of water.
5. Fill the bottle cap you kept with water and put it on the other side of the jar.
 - Cover the opening with plastic wrap and secure with tape or a rubber band.
7. Put the container in a spot that gets a lot of sun so the water can evaporate!
 - Watch the water cycle in action and watch the plant grow!



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Kentucky River Water Cycle

Materials needed:

- Journal or white construction paper
- Colored pencils, crayons, and a fine marker.
- Print the illustrated water cycle.

Draw your version of the water cycle or use this sketch as a template. You have a choice, print the sketch on copy paper and glue to your journal and color or draw directly into your journal.

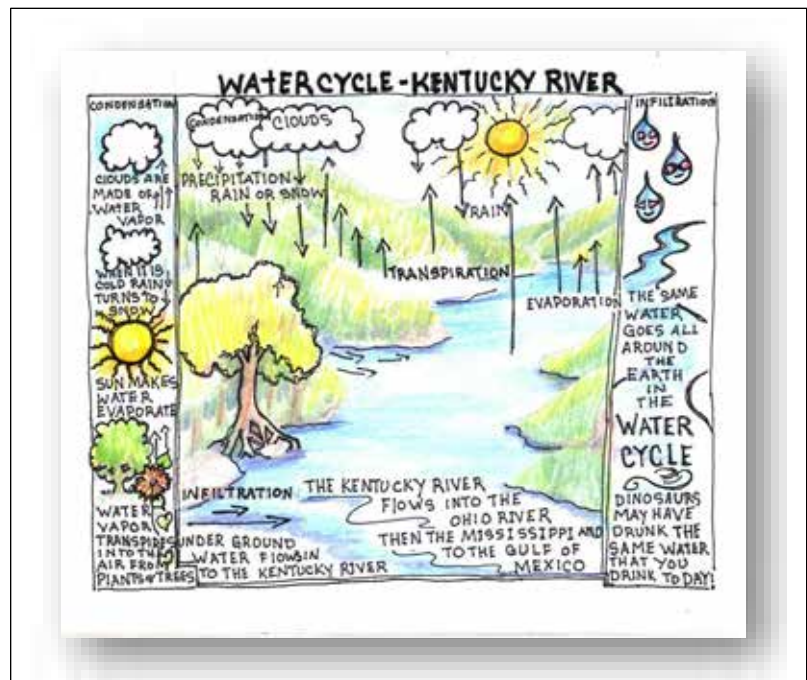
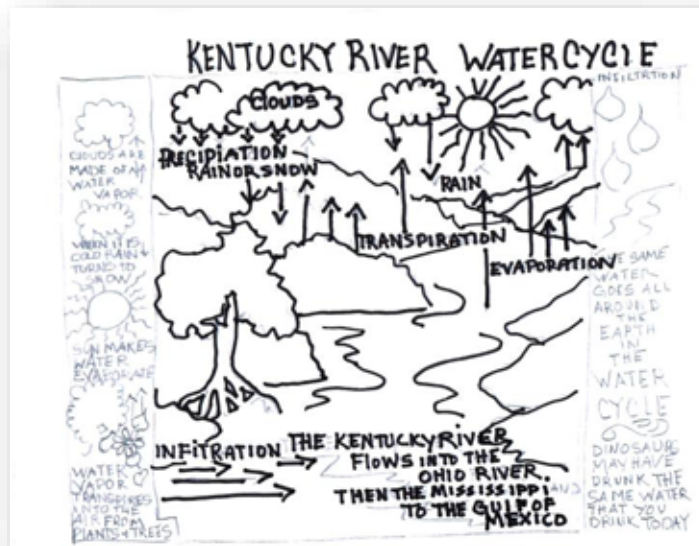
See the notes on each side of the sketch? Illustrate each example.

Include examples of:

- Precipitation - rain or snow
- Condensation - gas cools and turns to liquid
- Transpiration - when leaves exhale and breathe.
- Evaporation - water turns from liquid into vapor.
- Infiltration - water collects underground, in rivers and oceans.

As you draw, think of some different textures and colors to add to your sketch to add detail and interest. The fine black marker also helps emphasize the important components.

Using this example you can make a larger version as a poster or design a bulletin board!



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Lock and Dams

Here are some great photo shots of the lock doors and how they work. There is a photo of the Lockmasters house from the 1929 flood. Also, you can see boats inside the lock chamber waiting to disembark.



Look closely at this photo. This is the inside of a lock. Observe that the doors are closed, and water is being let in through the door valves. When the water gets to the height of the upper river the doors will be opened and the boats can safely exit the lock!

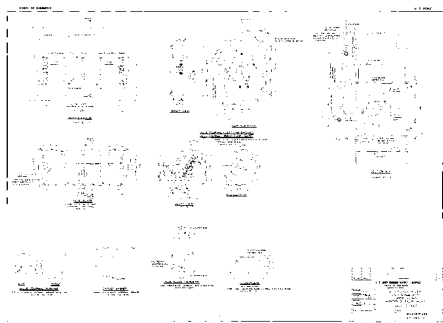
Lock Masters House during a flood,



These boats are waiting for the water to raise them to the right height! If you look closely, you can see the water coming through the valves.



You can see the close up of the lock doors. The first photo is from the inside of the lock and the second is from the outside of the lock.



This is an engineer's drawing of the lock doors, and how they fit into the lock housing. These doors were taken down and rebuilt to very precise specifications.

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Posters that POP!



Posters need a strong focal point to draw your eye to the main point of your message. Some of these designs lead your eye to the focal point, kind of a path. Can you visualize one of these designs as the background for your display? Color is also an important element to your design and message.

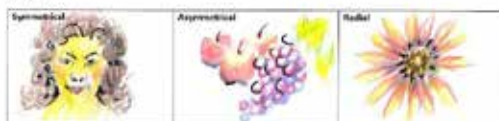


POSTERS that POP! These are simple shapes cut out of construction paper . Make your own poster with your own shapes, colors and focal points add your words and message. **Materials:** Scissors, 2-3 colors of construction paper, pencil and markers for writing your text on the poster.

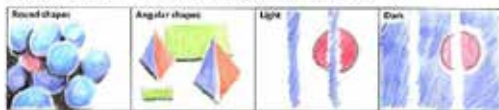
Making posters that pop! Using the principles of Design - science.

Contrast, Emphasis, Movement/ Action, Patterns/Repetition, Rhythm, Proportion, Unity, Variety. These are tools for making your posters pop!

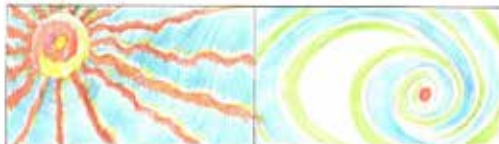
Balance



Contrast- difference between the elements (sharp and round, light and dark, large and small.)



Emphasis- center of interest



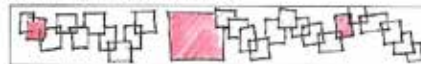
Movement- the look of action, move the eye.



Patterns- Repetition of elements (line, shape, color, texture etc.)



Repetition - elements are used over and over in various forms.



Rhythm- movement or beat



Proportion- relationships



Unity



The blank work sheet is available in **RESOURCES**.

This is a great way to add skills and focus for your posters, for science, stewardship, or anything that you need to tell a story or send a message about!

Add to your journal.

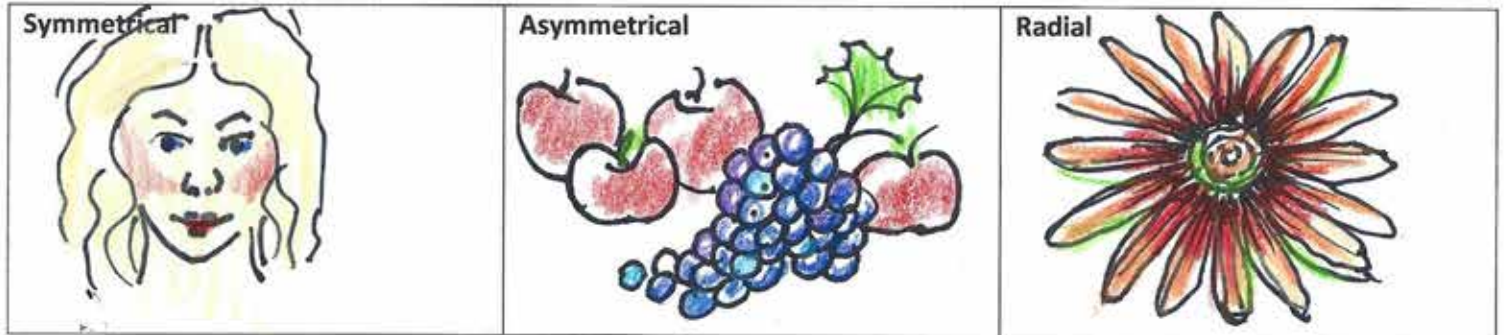
Materials: Colored pencils, pencil sharpener, markers, or crayons.

Visual Arts Journal -Principles of Design - Balance, Contrast, Emphasis,

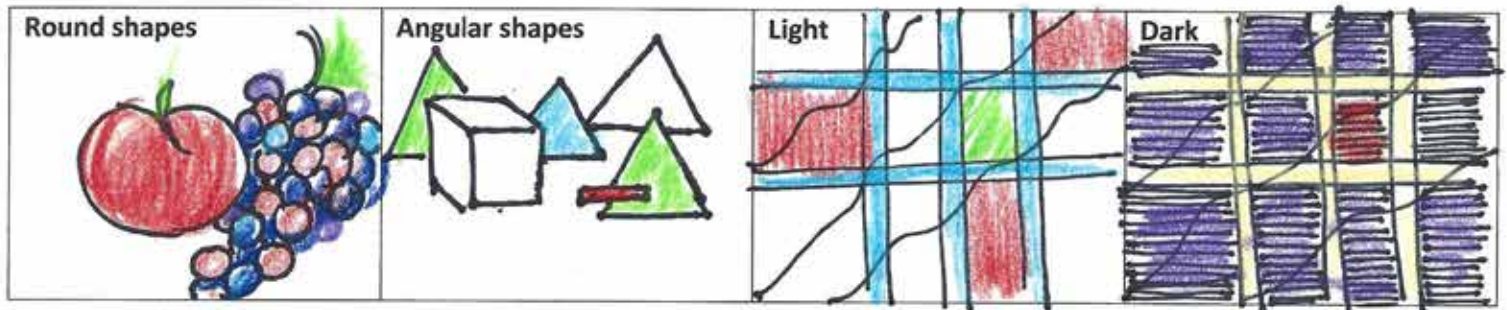
Movement/ Action, Patterns/Repetition, Rhythm, Proportion, Unity, Variety.

Pat Banks Watercolor, patbanks@wildblue.net

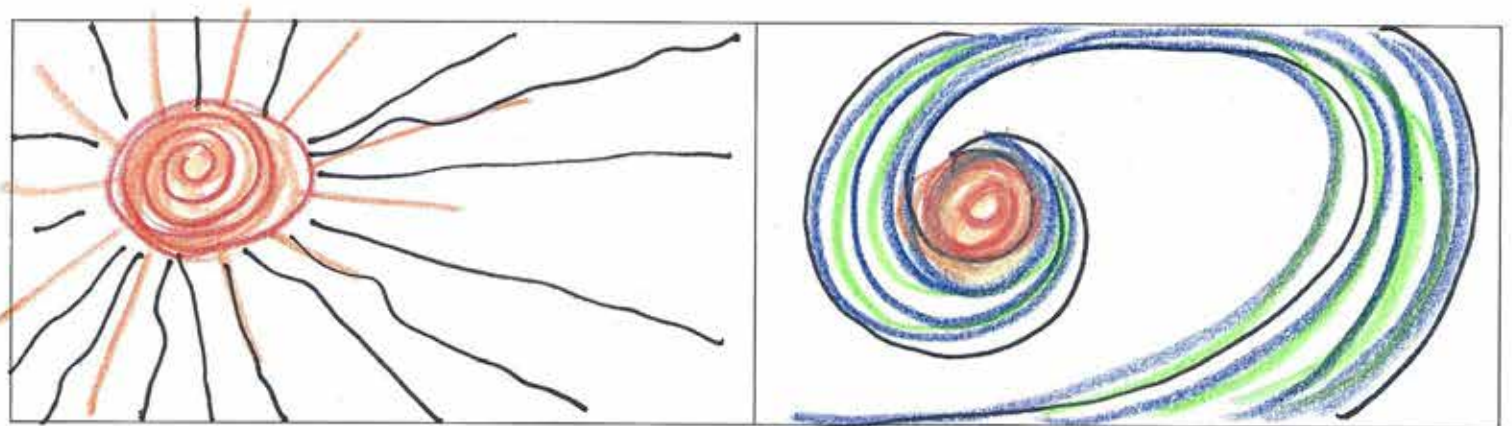
Balance



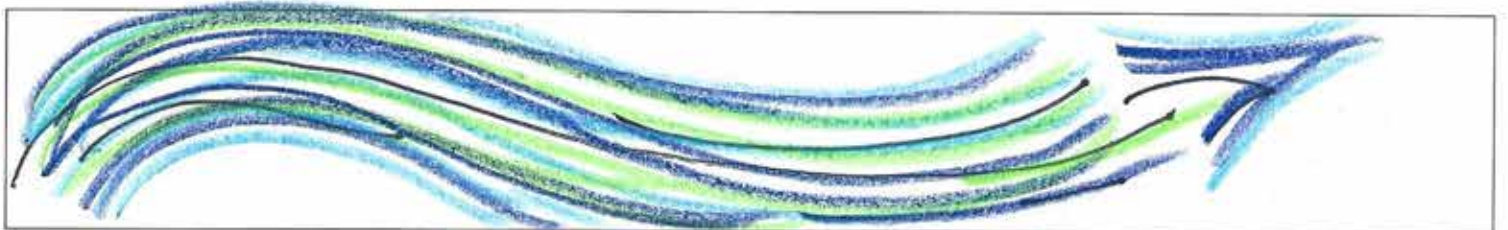
Contrast-difference between the elements (sharp and round, light and dark, large and small,)



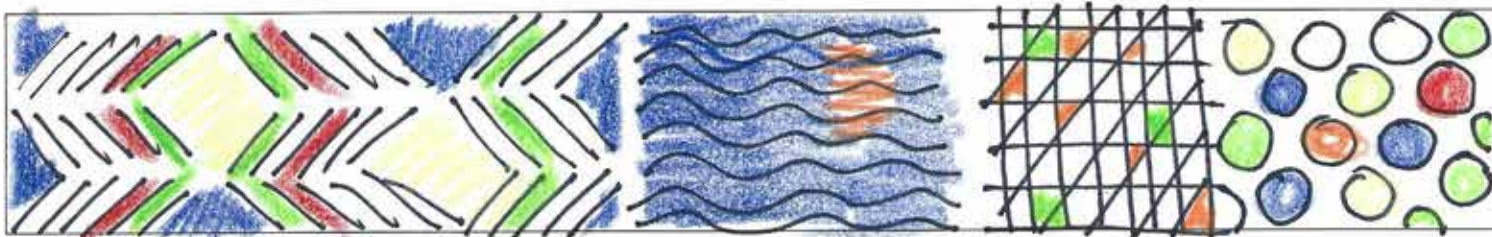
Emphasis- center of interest



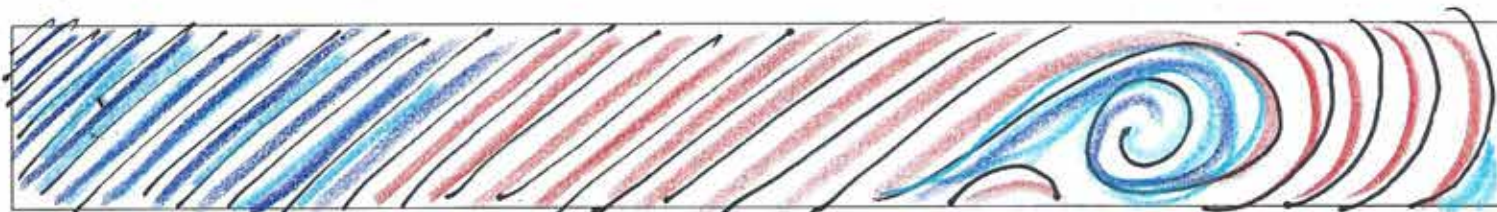
Movement- the look of action, move the eye.



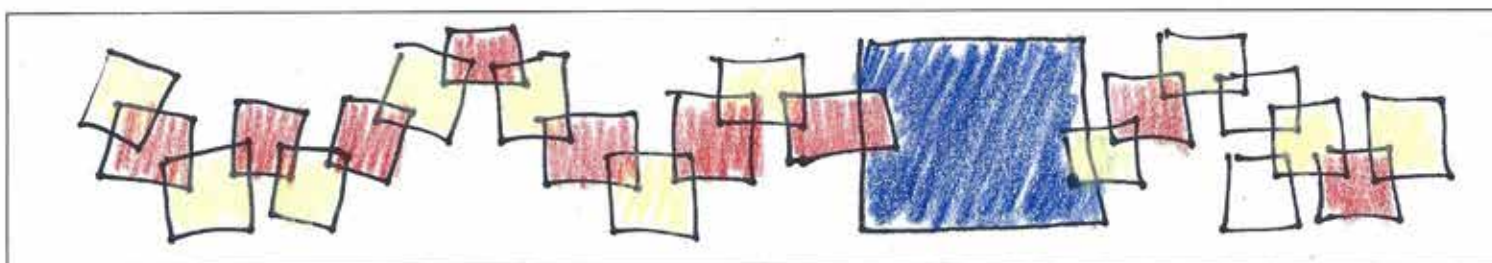
Patterns- Repetition of elements (line, shape, color, texture etc...)



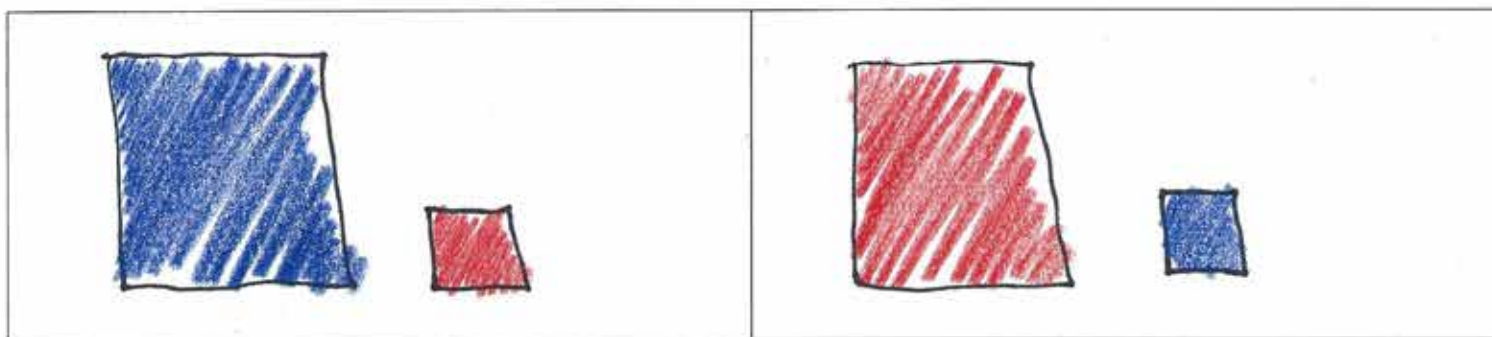
Repetition – elements are used over and over to achieve balance.



Rhythm- movement or beat

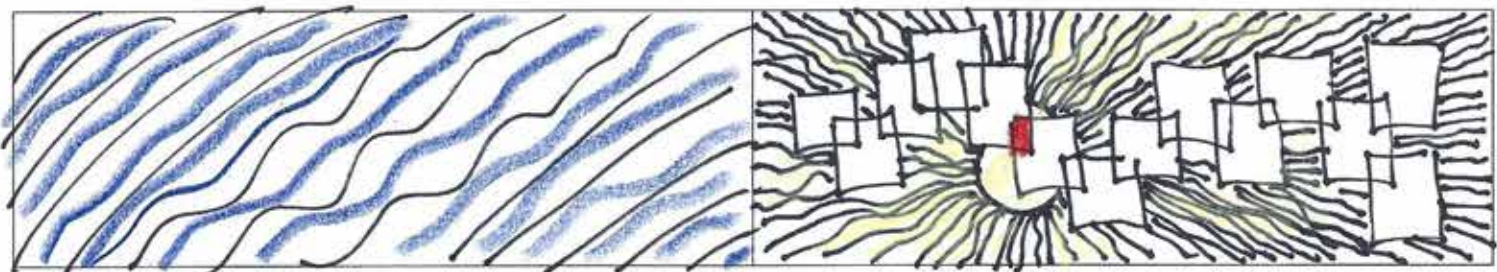


Proportion- relationships



Unity

Variety



Making posters that POP! Using the principles of Design - Balance, Contrast, Emphasis, Movement/ Action, Patterns/Repetition, Rhythm, Proportion, Unity, Variety. These are tools for making your posters pop!

Balance

Symmetrical	Asymmetrical	Radial
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Contrast-difference between the elements (sharp and round, light and dark, large and small)

Round shapes	Angular shapes	Light	Dark
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Emphasis- center of interest

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Movement- the look of action, move the eye.

--

Patterns-Repetition of elements (line, shape, color, texture etc...)

--

Repetition – elements are used over and over to achieve balance.

--

Rhythm- movement or beat

--

Proportion- relationships

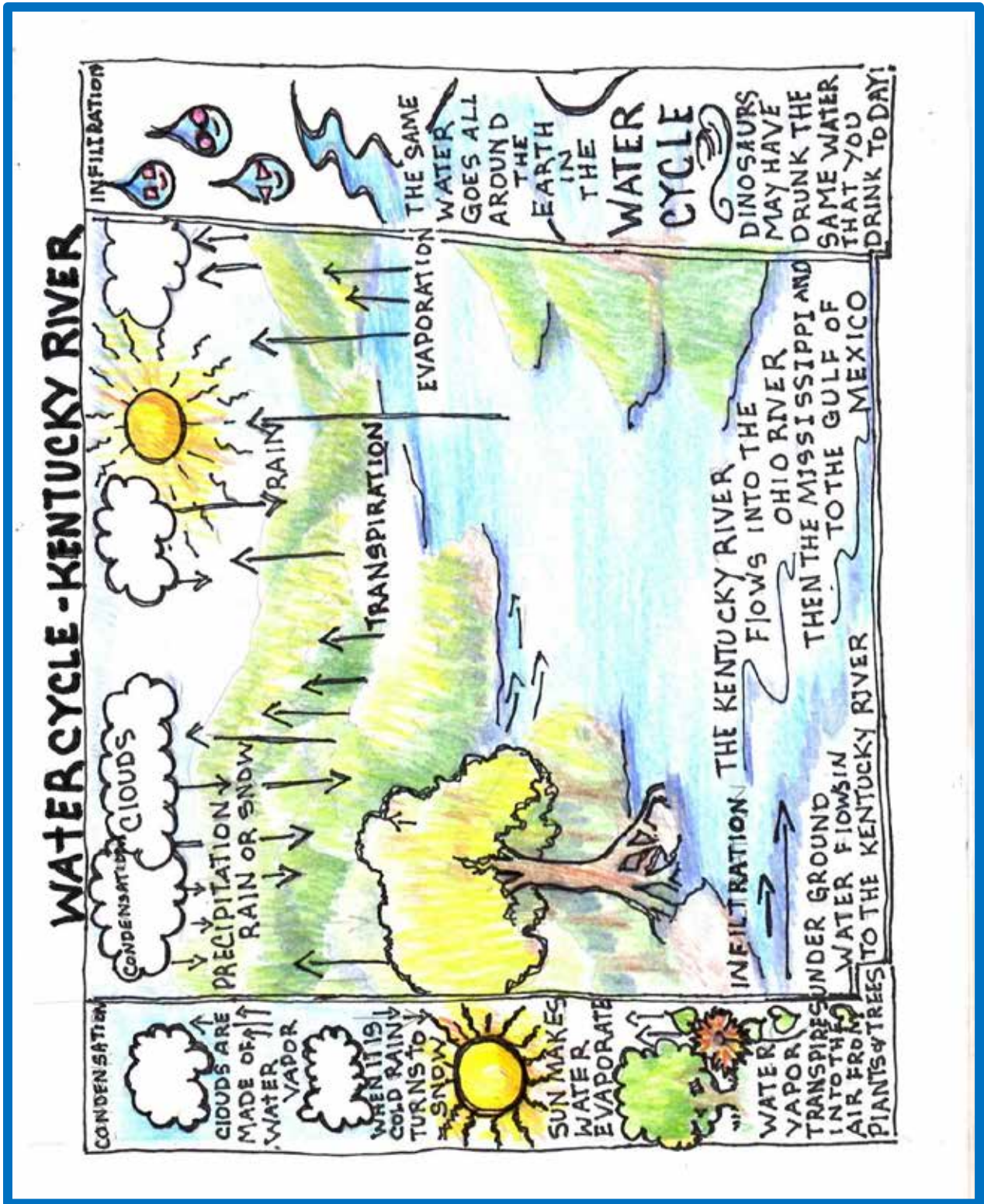
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Unity

Variety

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Sketch of the Water cycle.
 Sample for journal entries.



Discover the Kentucky River through the Arts



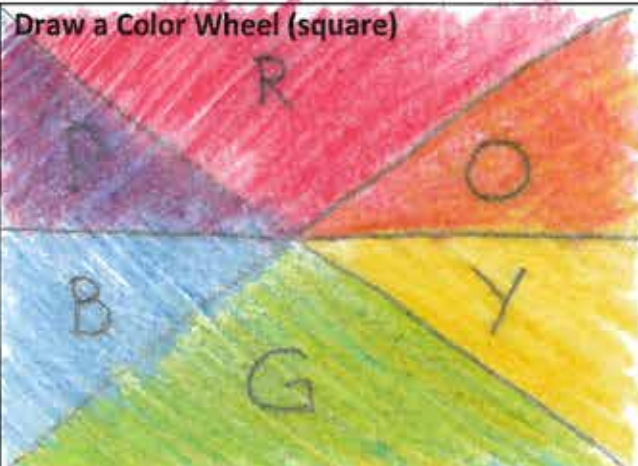
Illustrated Vocabulary of Elements of Art: Line, Shape, Forms, Space (positive and negative) Color, Texture, Value and Simple Perspective. We will use these tools to explore the Kentucky River and aspects of water.




Lines: how many kinds of lines can you make? Do some make you think of flowing water? Strait, ripples, broken, thick, thin, swirls, wavy, dots ,dashes etc.....





<p>Shapes (flat/ one dimensional): Geometric and Organic -use a closed line to create the shapes. Think of shapes that you might find in the Kentucky River or on the riverbank?</p>	<p>Circle</p>	<p>Square</p>	<p>Triangle</p>	<p>Organic</p>
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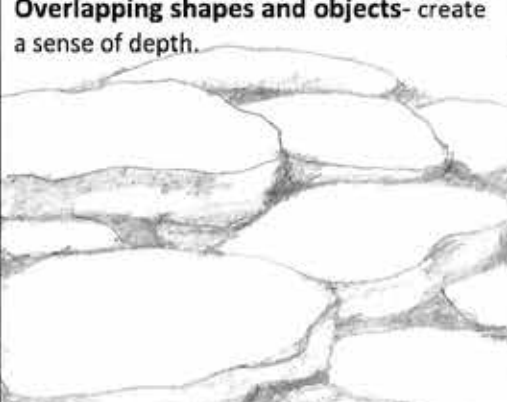
<p>Forms (3D shapes): use line and or shading to make shadows to create the illusion of depth.</p>	<p>Ball</p>	<p>Cube</p>	<p>Cone/pyramid</p>	<p>Organic</p>
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<p>Space (positive) -We can draw any shape or object. That is usually the positive shape/space. Let us draw a simple fish shape.</p>	<p>Space (negative) Now draw the same shape and just shade in the background or shadows. Now you are looking at the negative space/shapes.</p>
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<p>Primary Colors:</p>  <p>RED YELLOW BLUE</p>	<p>Secondary Colors:</p>  <p>Y+R= ORANGE Y+B= GREEN B+R= PURPLE</p>	<p>Draw a Color Wheel (square)</p> 
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<p>Textures- Think of textures from the animals, fish or plants and observe how the different textures create an implied line- that means you don't have to outline everything!</p>	 <p>FUR</p>	 <p>SCALES</p>	 <p>WATER</p>
--	---	---	---

<p>Values -0</p>	<p>1</p> 	<p>2</p> 	<p>3</p> 	<p>4</p> 
-------------------------	--	--	---	--

<p>One-point perspective- think of the Kentucky River!</p> 	<p>Fore ground, middle ground, and background. This helps you see depth and space in a landscape.</p> 	<p>Overlapping shapes and objects- create a sense of depth.</p> 
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Discover the Kentucky River through the Arts

Illustrated Vocabulary of Elements of Art: Line, Shape, Forms, Space (positive and negative) Color, Texture, Value and Simple Perspective. We will use these tools to explore the Kentucky River and aspects of water.

Lines: how many kinds of lines can you make? Do some make you think of flowing water? Strait, ripples, broken, thick, thin, swirls, wavy, dots, dashes etc.....

<p>Shapes (flat/ one dimensional): Geometric and Organic -use a closed line to create the shapes. Think of shapes that you might find in the Kentucky River or on the riverbank?</p>	<p>Circle</p>	<p>Square</p>	<p>Triangle</p>	<p>Organic</p>
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<p>Forms (3D shapes): use line and or shading to make shadows to create the illusion of depth.</p>	<p>Ball</p>	<p>Cube</p>	<p>Cone/pyramid</p>	<p>Organic</p>
<p>Space (positive) -We can draw any shape or object. That is usually the positive shape/space. Let us draw a simple fish shape.</p>		<p>Space (negative) Now draw the same shape and just shade in the background or shadows. Now you are looking at the negative space/shapes.</p>		

Primary Colors: <ul style="list-style-type: none"> • • • 	Secondary Colors: <ul style="list-style-type: none"> • • • 	Draw a Color Wheel (square)
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Textures- Think of textures from the animals, fish or plants and observe how the different textures create an implied line- that means you don't have to outline everything!			
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Values -0	1	2	3	4
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One-point perspective- think of the Kentucky River!	Fore ground, middle ground, and background. This helps you see depth and space in a landscape.	Overlapping shapes and objects- create a sense of depth.
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Discover the Kentucky River Watershed

Through History, Science, Art, Culture, Conservation,
Recreation and Education

How to Make A Project Journal

Pat Banks and Roberta Hounsell

Time:

45-60 minutes
(one class period)

Age- Can be adapted to grades 4-12

Materials and Resources:

You can be creative in your choice of materials. Enclosed are a few Ideas!

Construction paper—cut to 12”x12” (this will accommodate 8 1/2 x11” handouts)

Or you can also use a notebook and good drawing paper or cover stock, and or the clear sheet protectors.
See details.

Other items/tools for your art box!

- #2 pencil
- Black fine point marker.
- Use of glue/glue stick or school glue
- Use of ruler
- Scissors
- Red, Yellow, Blue colored pencils.
- Prang watercolor
- Hole punch
- Natural materials, sticks, raffia, feathers etc.

See each lesson plan for more details. You may use other resources! This is just to get you started.

The Project Journal is a critical component to the “Discover the Kentucky River Watershed”. It is a hands on creative way to help students see aspects of the Kentucky River from different perspectives and disciplines. This gives students tools for building on, collecting, and organizing that information. This is also a creative tool to help students expand, engage, and explore all their senses.

The Language of art and science overlap when observing/describing habitats, animals, plants, rivers, creatures, the creation of a poem, an illustration, or a painting/drawing. These observations and descriptions are critical for great science and great art.

Use all your senses!



Critical Thinking, Creativity and Stewardship

Sandra S. Ruppert, stated in **Critical Evidence , How the Arts Benefit Student Achievement**, "Students who participate in arts learning experiences often improve their achievement in other realms of learning and life." Sandra Ruppert refers to a study conducted by researchers from the University of California, using a federal data base of over 25000 middle and high school students. They found that students with a high arts involvement preformed better on standardized achievement tests than students with low arts involvement.

Dr Alan Lake, Morehead State University, told me (Pat Banks) his experience in the classroom teaching chemistry and biology. He said when he first started teaching in the mid 1950's text books had few photos and were printed in black and white. His students had to keep journals to record, draw, document and describe their observations whether it was from the natural world or the world they observed through telescopes or microscopes. Then during the 1960's an interesting thing happened. Science textbooks started using amazing color photos So the students still kept notes but they did not make drawings of their observations. They had the color photos to reference. But Dr. Lake started to notice that the students were having trouble with his tests. It was puzzling, these were bright kids! After a semester or two he made a change. He had the students keep their journals with notes but had them add back their own drawings. Even though they might use the photos as reference. An amazing thing happened that very semester. The students grades went up dramatically. He said he thought something about the act of physically drawing and observing made a connection to the brain.

The student journals that we encourage you to help the students develop for this project are meant to help them organize their notes and materials and give them a beautiful presentation to document their journey. We encourage the use of natural materials when you can! Sticks, raffia, feathers stones, interesting papers or other materials that add to the texture and sensual experience of the study of the Kentucky River Watershed (and the earth).

We protect the things we love.



Journal continued- Gather fun materials, raffia, ribbons, feathers, shells, stones, bones, sticks, any thing fun from the natural world to decorate your handmade book binding!



The raffia, ribbons and or string will tie the sticks to your book binding.



Cut your sticks the length of the paper, about 12". Try to find sticks that are straight. You will need 2 sticks for your book binder.

Estimate how many sheets (pages) of construction paper that you might need, if you have 10 handouts, drawings or maps etc. the you would need 6 sheets of paper, one sheet is for the front and back covers, you will be able to use both sides of your pages to mount your works. . Cut your construction paper to a 12" square. Measure one inch along the side of the paper and fold. Take your hole punch and punch 2 or 3 holes . That will give you a double row of hole that your top and bottom stick will fit between. Now punch your other papers. Measure to make sure the holes line up!!!!

Save the left over construction paper for other projects: crazy quilt, weaving etc....



This edge is folded. You are punching a hole through the folded paper.



Now open up the folded edges . Do you see the double row of holes? Stack your papers to make sure your holes line up. In the middle illustration do you see the stick on the top and bottom of your papers, placed between the holes? This step is the hardest, you will need to tie the raffia or string through the holes on the right of the top stick then loop around the bottom stick then back up to the top. Tie the ends together. That should stabilize your book binding! Now do the same thing to your next holes! Use as much raffia or ribbons to create the effect that you want tie your feathers, bones, shells etc to your Ties!



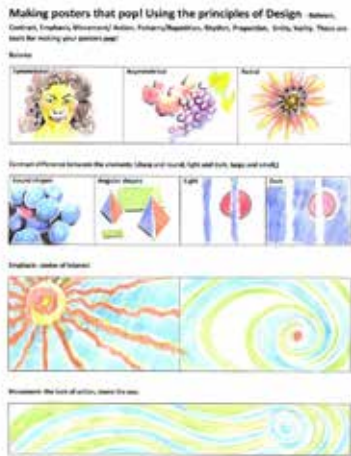
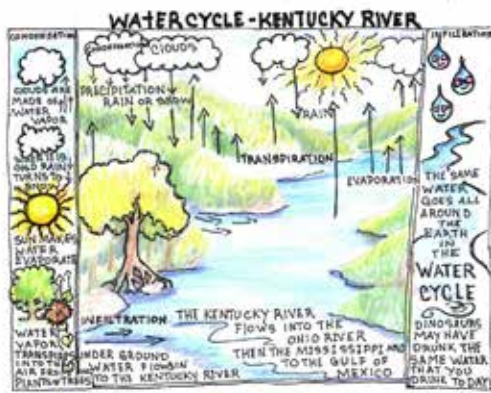
See the top and bottom stick?



Journal Continued

Here are some samples of drawings and worksheets you might include in our journal. That doesn't include any stories, maps, poems, posters etc...

Think of these experiences as building your tool box. Every time you take a minute to sketch, listen, observe, imagine, and write, you begin to tell your story!





Cooperative Learning Strategies

Roberta Hounshell

NOTE: If you have never used any of these strategies with your students, please take the time to practice them prior to using them!

Quote by Benjamin Franklin:

“Tell me and I forget.

Teach me and I remember.

Involve me and I learn.”

When using cooperative learning strategies, students work in groups to achieve a common learning goal. These strategies are not tied to certain content. While many apply to small groups, they can also be used with the entire class.

So how is this different from “just working in a group”? In conventional group work helping and sharing is minimal. Often the work is done by one or two students with not all of them contributing, and students who did not contribute are evaluated based on the contributions of the others. Emphasis in conventional groups is on the product only. In cooperative groups helping and sharing is expected, and the emphasis is on **process and product**. A major difference between regular and cooperative groups is accountability, as learners are accountable to each other in cooperative learning groups. Interpersonal skills, social interaction, and collaborative skills are also addressed in this form of learning. Students have the opportunity to practice skills like communicating and defending ideas, resolving conflicts, or disagreeing politely. Students can assess the effectiveness of their group at the end of a project/activity by analyzing how well its members collaborated.

Working a cooperative learning group, the following conditions must be met:

- Face -to-face interaction- this does not just mean “in person”, but could also be over the phone, video conferencing, through e-mail, etc. as long as it is direct interaction)
- Positive interdependence- members of the group rely on each other and have the mindset of succeeding together.
- Individual accountability- each student is held accountable for his or her own work by the other group members.
- Collaborative skills- working together often has to be taught. It is important to assess what skills students have in this area and what skills need to be taught and practiced.
- Group processing- groups need to monitor themselves to ensure they work together effectively.

What is the role of the teacher during cooperative learning?

- The teacher walks around the classroom and listens to the interactions in the groups, intervening whenever necessary. The teacher formatively assesses the level of independence, the quality of the work, and if students need to review and practice certain skills.
- The teacher offers help to structure the discussion, especially where specific tasks need to be completed by specific group members.
- The teacher offers specific help in form of different scaffolding levels and provides very little in form of direct answers to a content question.
- Teachers encourage students to use their own knowledge, ensure that students share their knowledge, resources, and learning strategies, treat each other with respect, and focus on high levels of learning and understanding.
- The teacher provides immediate attention to requests for help from a group.
- The teacher is a facilitator building trust and promoting open communication.

The websites cited in the sources shared the following strategies:

THINK-PAIR-SHARE

How to do it: This is also called turn and talk. After the teacher gives a question to a group, each student has a minute or two to think about the question. Then they turn and discuss with someone sitting next to them, and then they share with the whole class. (Teed, McDarvis, Roseth, n.d.).

Why is it useful? This strategy engages all students in the learning process, and it can be used with almost any lesson or content.

JIGSAW

How to do it: Students are placed into “home groups” and “expert groups” and are assigned a different topic within the same general topic. They work on researching their topics with others who have the same topic (the expert group). Then they return to their “home group” and teach them about their topic. When all have shared, the pieces come together to form a complete product (Reading Rockets, 2015).

Why is it useful? The strategy helps to get students to engage with each other and hold them accountable for their learning. Each student has to contribute so that all group members become informed on the topics. This can be used across content areas and allows all students to share what they know with others.

NUMBERED HEADS TOGETHER

How to do it: Students are placed into groups and given a number in their group. Students are asked a question and they discuss it with their group members for a specified amount of time. When the given time is up, the teacher calls out a number and all students with that number stand up and share what they discussed in their groups. The students build on and connect similar ideas among the groups and expand their discussions. (Colorado, 2015)

Why is it useful? This strategy allows students to discuss in small groups before they go into the whole class discussion. It also requires that all students contribute and listen to the conversations, and they have to have something to share when their number is called. This engages and involves each student in their learning.

TEA PARTY

How to do it: Students are divided into an inner and outer circle, facing each other. Once they are given a question, students discuss the question with the student they are facing. The students in the outer circle move into one direction after a given time, so they have a new partner to discuss with. Another question is asked, and more discussion starts with a new partner (Colorado, 2015).

Why is it useful? This strategy allows for all students to get a chance to share with another student, but additionally it allows students to come together and find a solution. Students need to be engaged in talking, sharing, or discussion to learn. The teacher needs to circulate to make sure that engaging discussion occurs, and to prompt those who need extra support.

ROUND ROBIN

How to use it: Students are placed in groups of 3-4 students and the teacher asks questions or gives them a problem to solve. The questions or problems can have multiple ways to solve a problem and multiple points of discussion. Students in their groups take turns answering and sharing their ideas with each other, working together with an answer they can all agree on (Colorado, 2015).

Why is it useful? This strategy gives the students the opportunity to work together to solve a problem or come to a common understanding. It requires each student in the group to participate and ensures that each student shares their ideas. They also practice taking turns and supporting each other.

WRITE AROUND

How to use it: Students are placed in groups of 3-4 students and each group is given a topic or idea. Topics/ideas have multiple answers or understandings. Students take turns writing their response to the question or idea on a piece of paper. After a specified time, the teacher asks the students to pass their paper on to the next person in the group so that they can add further to it or clarify what was written. The process repeats until all group members have contributed. It could go around more than once if students still have ideas to contribute (Colorado, 2015).

Why is it useful? This strategy allows students to demonstrate their knowledge about a topic or idea. It makes it necessary for students to pay attention to what their group members wrote so as to not repeat and to clarify what someone else wrote, if needed. This strategy ensures that each student is learning and contributing to complete understanding.

CAROUSEL

How to do it: Students are placed into groups of 3-4 students. The teacher places chart paper around the room with different questions on them, related to a certain topic. This can be done to activate prior knowledge at the start of a new unit or at the end of a unit as a review. Each group records their answers in a different color, so they travel around the room with that color marker. They remain at each chart for a specified amount of time. The teacher might want to have students write answers on their own papers before they start going around to be sure each student provides input. Once all have shared, the whole class comes together and shares what is written on their posters.

Why is it useful? With this strategy students do not only work together within their groups but also within the whole class. They have to read what others already wrote and come up with new ideas rather than copying what has already been recorded by others in their group or other groups. Members of the group can help others from their group to generate something to record on the posters (Gray, 2016).

CIRCLE -THE SAGE

How to do it: The teacher asks a question in class and then asks every student who can answer it to stand up. All other students can now choose a classmate and listen to the explanation.

Why is it useful? This strategy utilizes peer tutoring.

AGREE-DISAGREE LINE-UPS

How to do it: The teacher announces a statement, like, “I feel my opinion is valued in this class”, or “Everybody needs to do something to improve pollution”, or anything that goes along with the content covered at the time. Students form a line with students who “strongly agree” at one end and “strongly disagree” at one end. The remaining students stand in between depending on where they fall on the spectrum in between with their opinions. Through Timed - Pair -Share the students listen carefully to those with a similar point of view or the teacher folds the line so they listen to and understand a view different from their own.

Why is it useful? Students learn to listen to what positions others have and why.

RALLY COACH

How to use it: Students take turns in pairs, one student solving problems while talking through it thinking aloud, while the others listen, coaching where necessary and provides positive feedback. Roles are reversed to do another exercise.

Why is it useful? This strategy maximizes interaction and feedback. Students learn how to work by themselves when solving a task, but also to interact, give and receive feedback from a classmate. Every student is active at the same time, either sharing knowledge or providing feedback.

FACT OR FICTION

How to use it: After giving students a task, they are asked to write two correct answers and one that is incorrect. Others in the group have to determine which is correct and which is incorrect.

Why is it useful? Not only do students have to come up with correct answers, but they have to use higher level thinking when coming up with answers that are incorrect.

CORNERS

How to use it: The teacher places answers in each corner of a room. When a question is asked, students go to a corner and discuss the answer they chose with others who made the same choice.

Why is it useful? Students must choose an answer and then discuss justification for their answer.

QUIZ AND FIND

How to use it? Students write a question they do not know or are not clear about a topic they studied or are getting ready to study on a slip of paper. Following this they must walk about, finding someone who can answer it. Each student must also try to answer at least one question someone else asked. The experiences are shared with the class upon completion of the activity.

Why is it useful? Students try to utilize peers for information instead of the teacher or other sources.

EXPERTS

How to use it: Groups research something (all becoming “experts” in their topic) Next, they mix up and share something they learned about their topic with students that studied other topics.

Why is it useful: It allows students to tap into their interests and “shine” by sharing something about what they learned.

!!!???-----EXCLAMATION/QUESTION/FAMILIAR

How to do it: Learners read or listen to a text and mark/ orally indicate a piece of information that they were familiar with, that was new (!) and that they knew a little about but need clarification (?). In groups they discuss new information and information they needed to clarify.

Why is it useful? Students have to process the information and verbalize the level of knowledge they have about a topic, which requires higher level thinking skills. Then they have to discuss and clarify the information, again using verbalization and processing skills.

SOURCES:

www.teacheracademy.edu

Knilt.arcc.albany.edu (this source has links to u tube videos that demonstrate the strategies also)

www.facultyfocus.com

www.indeed.com

www.teaching with simplicity.com

www.teach4beginners.com





Two EXAMPLES of Sensory Poems:

TOPIC WORD: RIVER

The topic word as your title.

I see...a blue band of water snaking between the mountains.

I feel...the wind that blows over the water.

I smell...the flowers that grow on its banks.

I hear...the waves cascading down into the valley.

I taste...the water droplet on my tongue.

(Optional- add an overall feeling) Such as: *It makes me feel happy with lots of memories.*

YOUR POEMS

Topic Word:

Topic Word

Discover the Kentucky River Watershed

Through History, Science, Art, Culture, Conservation, Recreation and Education

SENSORY POEM

SENSORY POEM

A sensory poem describes a scene, an object, or an idea with vivid words that appeal to the five senses.

It creates a descriptive mind picture of an object or event because the words echo the reader's own sensory experiences of the object or event.

The poem uses all five senses to describe something.

1. Choose a topic.
2. Think of a word for each sense that comes to mind for the topic.
3. You could also add an overall feeling at the end
Of the poem.

You can also write the poem as a riddle: make your topic word the answer.

TOPIC WORD: FISH

IN that case you end your poem with a question:

What is it?

Put Topic word as the answer.

I see...many different sizes and colors.

I feel... how slippery they feel.

I smell...seaweed on their scales.

I hear... how they splash in the water.

I taste... a drop of water that splashed up from the river

What am I??? _____ (A FISH)

Discover the Kentucky River Watershed

Through History, Science, Art, Culture, Conservation, Recreation, and Education



How to write a Haiku Poem

Source: <https://grammar.yourdictionary.com>

Traditional Haiku Structure: There are 3 lines. Totaling 17 syllables

- The First Line has 5 syllables.
- The second line has 7 syllables.
- The third line has 5 syllables like the first.

Punctuation and capitalization are up to the poet and need not follow rigid rules in structuring the sentence. A haiku conveys a single moment where the poet suddenly sees or realizes something special.

Rules for syllabication

A syllable is a single segment of unbroken sounds that has one vowel sound. A diphthong or a syllabic consonant. It may or may not be surrounded by consonants. There are five essential rules when using or working with syllables. For further details see:

Wikipedia.com-How to Teach and Learn Syllabication

<https://study.com-Syllabication> Process and Rules.

Examples of syllables:

- rain, (1 syllable)
- drop, (1 syllable)
- Water, wa-ter (2 syllables)
- Waterway, wa-ter-way (3 syllables)
- interesting, in-ter-est-ing (4 syllables)

Note: The consonant “y” is not strictly a vowel but behaves like one.

EXAMPLE of poems:

1. An ocean voyages
As waves break over the bow.
The sea welcomes me.
2. **“The Old Pond”:**
by Matsuo Basho
(one of the four great masters of Haiku)
An old silent pond
A frog jumps into the pond
Splash! Silence again.
3. **“A World of Dew” by Kobayashi Issa**
A world of dew,
And within every dewdrop
A world of struggle.

There is room below for 4 Haiku poems.

1
2

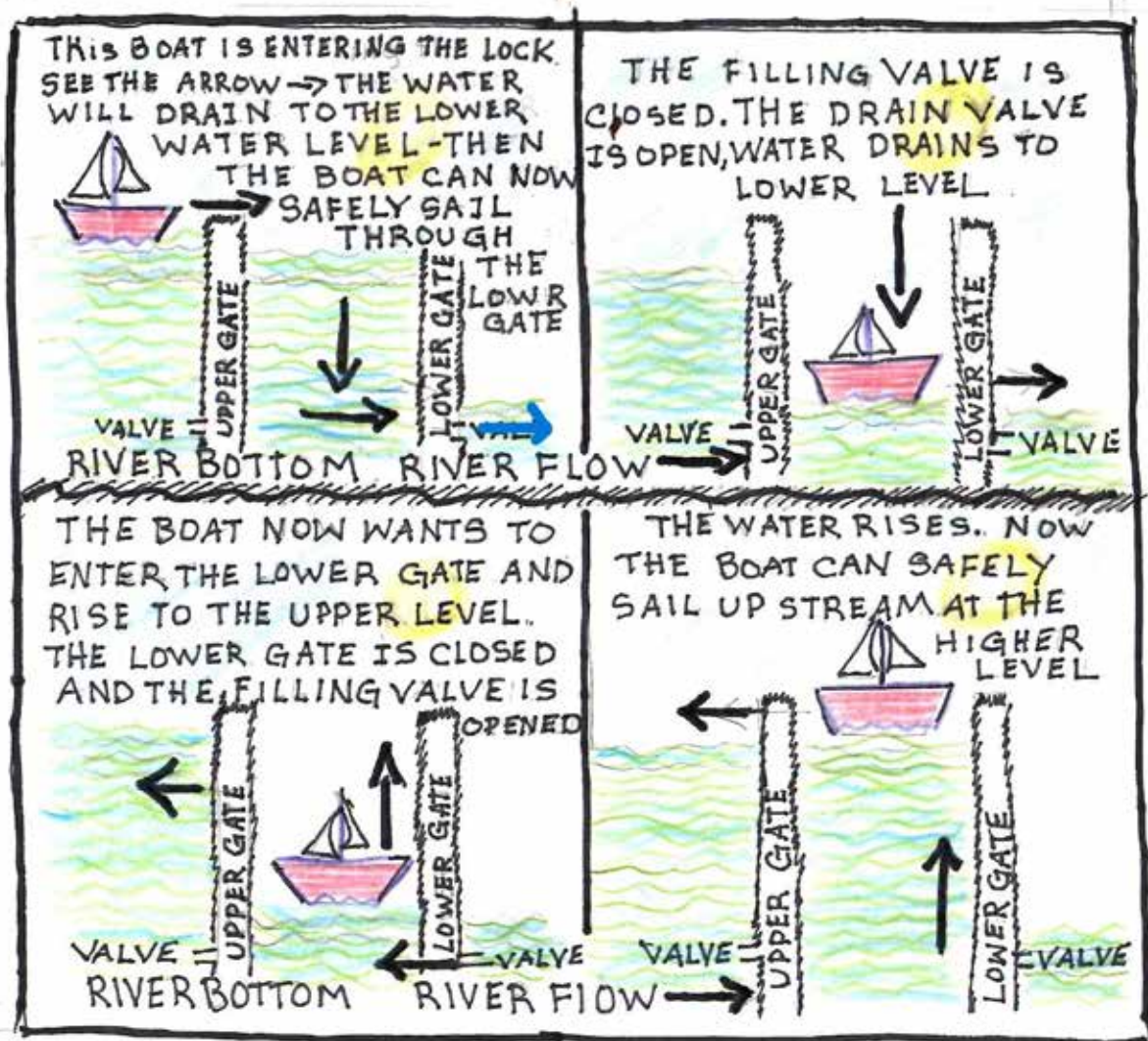
Think: rivers, creeks, and rain. Use your senses.
How does it smell, taste, sound?

3
4

Principles of the Lock and Dam System

This sketch illustrates how the lock and dam's work. Try to draw this in your journal with the arrows so that you can get the concept in your mind!

Based on Pascal's Law: we know that water, in a closed system, will seek to find its same water level throughout.



Discover the Kentucky River Watershed

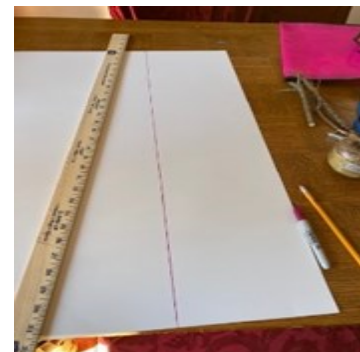
Through History, Science, Art, Culture, Conservation, Recreation, and Education

My Kentucky River Project Portfolio

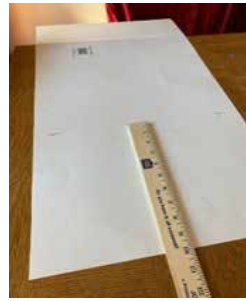
Materials:

- 1 sheet of posterboard (preferably white so it can be decorated)
- 1 ruler or yardstick (as the posterboard is so large)
- Scissors
- Pencil
- Twine or yarn
- Sticks (you gathered outside)
- Coloring pencils or anything else you want to use to decorate your portfolio
- Hole punch

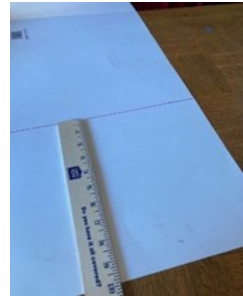
1. Place the posterboard in front of you on a table, with the long side up and glossy side down)
2. From the side, measure 15 inches and mark the points with a pencil
3. Connect the dots
4. Cut along the line (the paper you cut off is not needed)



5. From the bottom measure 10 inches and mark the spots.



6, Connect the dots with a line (this is a folding line).



7. Along this line, fold the paper up neatly and crease the fold.



8. From the top fold the remaining paper down to serve as the flap - You now have two 10 inch sections and the flap as shown in the photo.



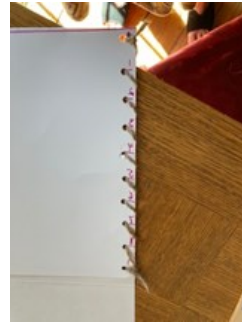
9. Mark the first piece off at ½ inch, from then on mark off 1-inch intervals (you might use a pencil and not markers as in the photos as you want to decorate the portfolio. You can erase the pencil marks when you are finished.) Repeat on the other side.



10. Cut two 36 inches of twine and lace it through the bottom holes, secure with a knot, also secure the top with a knot. Repeat on the other side.



11. You can now use your portfolio with the square flap or add step to make the flared sides on the flap as shown in the photo.

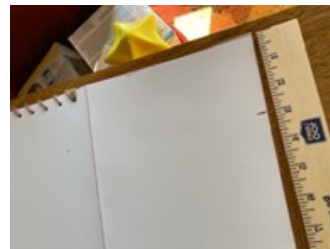


12. Measure 3 inches from the side on the bottom of the flap and mark the spot.

Next steps if you choose1

13. Draw a line from the spot to the top edge- repeat on the other side.

14. Cut along the lines on both sides and now your flap is angled.



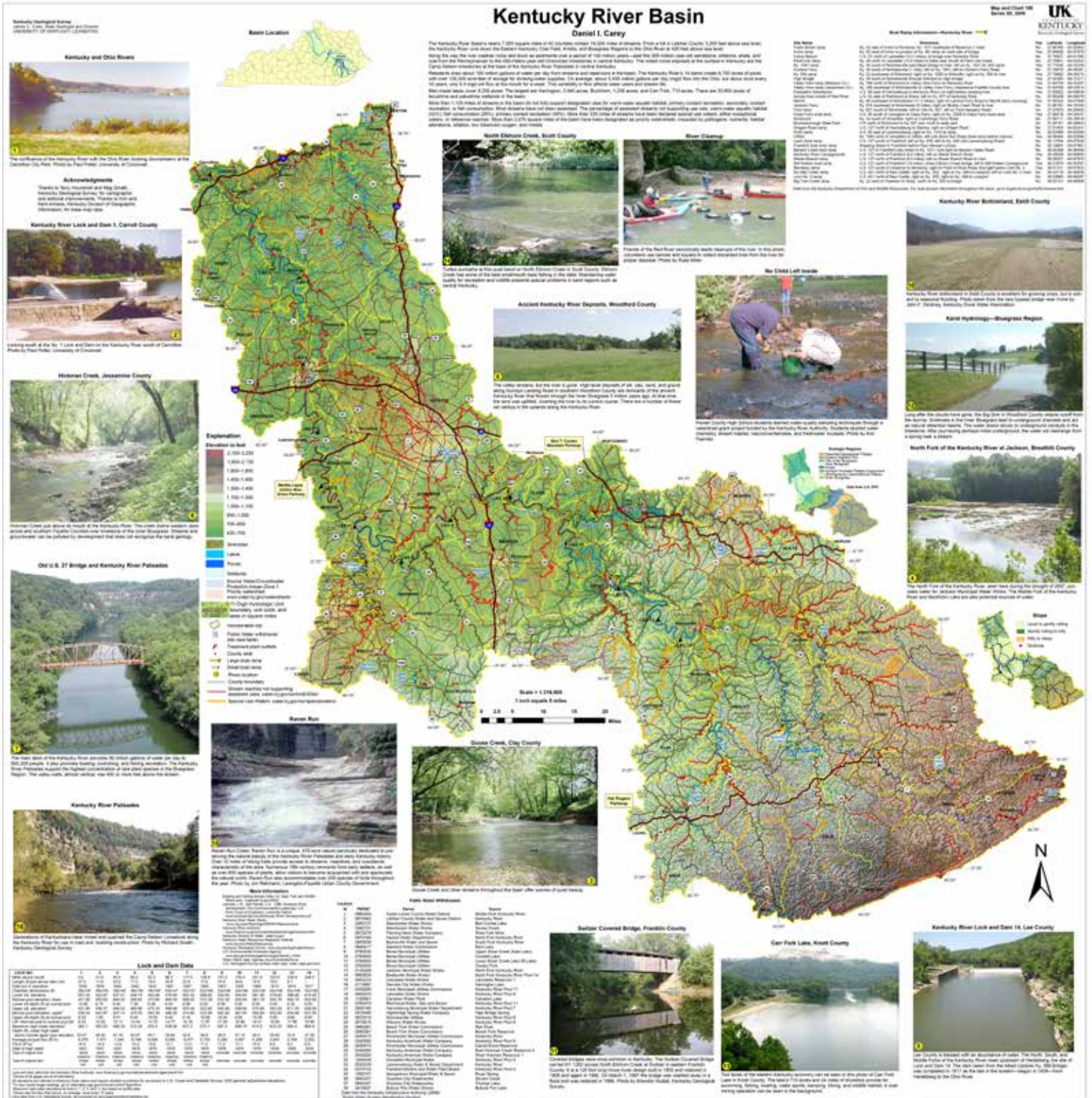
15. At this step you can decorate your portfolio or decorate it as you complete the lessons with various content.



16. Cut 2 yards of twine and wrap it around the portfolio, tying some twigs (see photo) to decorate your portfolio further!



Kentucky River Watershed





Educational Standards

Appendix: Kentucky Academic Standards

Discover the Kentucky River Watershed

Through History, Science, Art, Culture, Conservation, Recreation, and Education

The Kentucky Academic Standards (KAS) contain the minimum required standards that all Kentucky students should have the opportunity to learn before graduating from Kentucky high schools. The standards address what is to be learned but do not address how learning experiences are to be designed or what resources should be used. This section offers a selection of KAS that can be addressed using this curriculum. As the curriculum is designed to address grade levels 4-8 and as it offers learning opportunities across the curriculum, the selection of KAS presented here is only a basic selection of possible standards the content addresses. If teachers select to complete only parts of a lesson and/or complete only some of the suggested activities, KAS addressed will vary. Standards from earlier grades are sometimes listed as the content is important base knowledge for the lesson.

NOTE: The development of lesson specific vocabulary is included with each lesson, and lessons also have related recipes. The chapter about locks and dams also addresses some physics/physical science in form of Pascal's Law. Those areas are not addressed by specific standards.

There are additional resources suggested and cited which encourage additional activities that might also not be addressed with KAS listed here. If content is delivered in modified form, i.e. texts are read to the students, reading standards might not be addressed, or content might be delivered overall at a higher or lower level with changes in delivery and complexity, which would impact which standards are covered.

Overall, this curriculum offers to learn about the Kentucky River watershed with activities/content across the curriculum to address a variety of levels and multi-sensory learning modes. It provides teachers with content that can be adapted to address the learning needs of their diverse student populations. KAS can/should be adapted accordingly.

KAS published on the Kentucky Department Education (KDE) website 9/15/2023 are referenced in this section.

Lesson 1: Geological History of the Kentucky River

Lesson GOAL: Our goal is for students to understand that our earth in general and our Kentucky River watershed in particular took a long time to form. We want students to feel more connected to this river and its watershed and to become engaged in learning about it and its connection to the larger world and the universe. We want students to be part of the discussion about our dependence on a healthy and sustainable environment. Part of this is to develop an understanding of our stewardship responsibilities, our values and practices in our watershed and in our world in general.

SCIENCE

2-ESS1-1 Use information from several sources to provide evidence that earth events can occur quickly or slowly. 2-ESS1.C; 4-ESS1.C: The History of Planet Earth. 4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

6-ESS1.C: The History of Planet Earth. Tectonic processes continually generate new ocean sea floors at ridges and destroy old sea floors and trenches.

READING

RI.3.1: Ask and answer questions and make and support logical inferences to construct meaning from text.

RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.6.1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.7.1: Cite pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.8.1: Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.3.4; RI.4.4; RI.5.4; RI.6.4; RI.7.4; RI.8.4 Determine the meaning of general academic words and phrases in a grade level text and describe how these words and phrases shape text.

MATHEMATICS

A) Numbers and Operations in Base 10 (NBT)

KY.5.NBT.2 Multiply and divide by powers of 10

KY5.MD.1 Convert among different size units (mass, weight, liquid volume, length, time) within one system of units (metric system, U.S. standard system and time)

B) Ratio and Proportional relationships (RP)

KY.6.RP.1; KY.7.RP.1 Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities

VISUAL ARTS

(In this lesson students will have the opportunity to design a poster or bulletin board related to the topic)

Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

STEWARDSHIP

5-ESS3.C Human Impacts on Earth Systems. Human activity in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individual communities are doing things to help protect Earth's resources and environments.

5-ESS3-1 Obtain and combine information about solutions individual communities use to protect the Earth 's resources and environment.

5-ETS1.A: Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.

8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 2: The Mythical, Magical, Eluama, the Kentucky River Mascot

Lesson Goal: Introduction to ELUAMA, the Kentucky Riverkeeper mascot. A mascot is important because it acts as a visual representation of an organization. It is meant to build awareness of the organization, attract interest to become part of working towards achieving the goals of the organization, and to foster an emotional connection with the people engaged in its mission. Ultimately, we hope to increase loyalty and recognition through a memorable and relatable character. ELUAMA is a magical water serpent that has taken residence in the Kentucky River and has many adventures with animals in the watershed. She learns about animals, plants (ancient and modern), and people and uses her magical abilities to speak to them. ELUAMA can take on different forms and sizes. She can go on adventures, like riding on a drop of water through the water cycle. Her name ELUAMA comes from the Native American words ELU=beautiful and AMA=water (in some Native American languages), so her name means "Beautiful Water". She chose her name because the first people she encountered in the Kentucky River were Native Americans. Many opportunities are provided and suggested to engage the students in multisensory and cross-curricular activities. Learning with ELUAMA provided many opportunities for activities such as research, creative writing and other learning opportunities across several content areas.

READING/LANGUAGE

RL.4.1; RI 4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.5.1; RI 5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RL.4.3 Describe in depth a character's thoughts, words and/or actions, the setting or event(s).

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

VISUAL ARTS

(In this lesson students will have the opportunity to draw ELUAMA, the mythical, magical water serpent/dragon) as they imagine she would present herself to each student as she can take on any imagined size or shape).

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem.

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

Lesson 3: Stewardship

Lesson Goal: We strive to develop an understanding that we must develop and practice understanding of stewardship of the Kentucky River, its watershed and our world in general.

Practicing stewardship of a river means to actively care for and protect it by taking actions like reducing pollution, conserving the natural habitat along the riverbanks, monitoring water quality, and engaging in responsible recreational activities on the water, ensuring the river remains healthy and sustainable for future generations. We must understand that what happens on the land and in the air affects what is in our water and in our bodies. The curriculum explores a variety of philosophies, language respectful of nature and different cultures, and experiences in the approach to using the land and resources. Differences in stewardship, sustainability, and responsibility are part of our history. With the development and understanding of stewardship, we hope to foster that students will apply stewardship activities to ensure sustainability of the world we live in.

READING/LANGUAGE

L.3.3; L4.3; L.5.3; L.6.3; L.7.3; L.8.3 Students will apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style and to comprehend more fully when reading or listening.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

VISUAL ARTS

(In this chapter the students have opportunities to design posters and design a “Stewardship windsock”.)

Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work.

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem.

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

Lesson 4: Kentucky River Watershed and Habitats

Lesson Goal: The goal is to provide students with an understanding that the Kentucky River watershed and habitats are ancient with evidence of ice ages and ancient seas. Rocks, geodes, layers of slate, coal and sandstone are evident of ancient epochs and histories of the region. A variety of tree species on hillsides, valleys and in wetlands provide food and shelter for many animals and the grasslands/wetlands support a large variety of plants, flowers and herbs. Along with a large network of springs, creeks, streams, and rivers, the Kentucky River watershed supports multiple habitats for birds, mammals, fish, reptiles, insects, including butterflies and moths. The rocky palisades, rock cliffs, and waters were once filled with an abundance of animals. People have lived in the Kentucky River watershed for thousands of years. Students will also be provided with the opportunity to learn about and research endangered and current species in the watershed. Stewardship opportunities will also be addressed.

READING

RI.3.1: Ask and answer questions, and make and support logical inferences to construct meaning from text.

RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.6.1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.7.1: Cite pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.8.1: Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.3.4; RI.4.4; RI.5.4; RI.6.4; RI.7.4; RI.8.4 Determine the meaning of general academic words and phrases in a grade level text and describe how these words and phrases shape text.

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

SCIENCE

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features. (Maps can help locate the different land and water features of Earth.)

4-ESS3.A: Natural resources. Energy and fuels that humans use is derived from natural sources, and use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

5-ESS2.C: The roles of Water in Earth's Surface Processes. Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground, only a tiny fraction in streams, lakes, wetland and the atmosphere.

6-LS2.A: Interdependent Relationships in Ecosystems. Organisms and populations of organisms are dependent on their environmental interactions both with other living things and with non-living factors. In any ecosystem, organisms and populations with similar requirements of food, water, oxygen, or other resources may compete for limited resources, access to which consequently constrains their growth and reproductions. The growth of organisms and populations re limited by access to resources. (Emphasis is on cause-and-effect relationships between resources.)

6-ESS2.C: The Roles of Water in Earth's surface Processes. Water's movement- both on the land and underground cause weathering and erosion, which change the land's surface features and create underground formations.

8-PS3.A: Natural Resources. Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are

limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet.

8-LS2.C: Ecosystem Dynamics, Functioning, and Resilience. Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.

8-LS. D: Biodiversity and Humans. Changes in biodiversity can influence humans' resources, such as food. Energy, and medicines, as well as ecosystem services that humans rely on-for example water purification and recycling.

8-S2.C: Ecosystem Dynamics, Functioning, and Resilience. Biodiversity describes the variety of species found on Earth's terrestrial and oceans ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of health.

VISUAL ARTS

(In this lesson students have the opportunity to produce their own drawings of animals and plants in the watershed habitat and to design a backyard habitat map.)

Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work.

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem.

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

STEWARDSHIP

5-ESS3.C Human Impacts on Earth Systems. Human activity in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individual communities are doing things to help protect Earth's resources and environments.

5-ESS3-1 Obtain and combine information about solutions individual communities use to protect the Earth 's resources and environment.

5-ETS1.A: Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account.

8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 5: The First People

Lesson Goal: To develop an understanding that Native American history goes back over eleven thousand (11,000) years in Kentucky. It must be noted that much of that rich cultural history happened before history was recorded. Most of what we know, or think we know, is recorded and stored with the Commonwealth of Kentucky's archeological records. Documented are the remains of thousands of camps, villages, town sites, caves, rock shelters, leftover monuments, and earthen and stone mounds. The history of Native Americans has not been clearly documented because their culture and history were handed down in oral traditions. Artifacts indicate that that are still more stories to be uncovered and to be told.

READING

RI. 5.2 Analyze how central ideas are reflected in a text and cite relevant implicit and explicit evidence to support thinking.

RI .5.3 Explain the relationships or interactions between individuals, events, ideas or concepts in a historical, scientific or technical text based on specific information over the course of a text.

RI.5.6 Analyze multiple accounts of the same event or topic, noting important similarities and differences in the perspective they represent.

RL.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RL.6.2 Analyze how the theme is reflected in a text by citing particular details and /or providing an objective summary.

RI.5.2; RI 6.2. RI 7.2 Students will determine central ideas of the text and analyze their development, cite specific evidence, including summary, paraphrase and direct quotations to support conclusions drawn from the text.

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

SOCIAL STUDIES

4.H.CO.1 Explain examples of conflict and collaboration among various groups of people from European Exploration to the Thirteen Colonies as they encountered one another.

4.H.KH.1 Identify and describe the significance of diverse groups in Kentucky from European Exploration to the Thirteen Colonies.

7.G.HI.2 Examine ways in which one culture can both positively and negatively influence another through cultural diffusion, trade relationships, expansion and exploration. While the Age of Exploration brought about economic growth in Europe, a variety of American Indians and indigenous people in the Americas suffered. Europeans brought diseases like smallpox, which devastated American Indian populations.

VISUAL ARTS

(This lesson provides opportunities such as writing the Cherokee alphabet or exploring parts of the syllabary and drawing squash, beans, corn while making a diagram of how they were effectively planted. Students could select to draw masks that represent the 7 different

clans of the Cherokee, or they could make one that matches the clan that students identify to best represent themselves. In addition, they can explore weaving with paper strips and design and make a woven wall hanging using natural materials.)

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem.

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

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VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

STEWARDSHIP

5-ESS3.C Human Impacts on Earth Systems. Human activity in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individual communities are doing things to help protect Earth’s resources and environments.

5-ESS3-1 Obtain and combine information about solutions individual communities use to protect the Earth ‘s resources and environment.

5-ETS1.A: Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account.

8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 6: The First Settlers, The Path Through History and Children Living on the Frontier

Lesson Goal: To develop an understanding that the history of the first settlers in the Kentucky River watershed is intertwined with that of the native people and with world events. Research revealed that women and black people also played an important role in the history in the Kentucky River watershed. The History is complicated and multi-faceted, which we cannot fully represent, but we hope to make some connections and links and hope to inspire future scholars. Some significant dates, treaties, and events are represented. Some of those were regional in nature, but some events originating in the larger world significantly impacted the people, settlements, land use, and development of the Kentucky River watershed as we now know it.

READING

RI.3.1: Ask and answer questions, and make and support logical inferences in order to construct meaning from text.

RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.6.1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.7.1: Cite pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.8.1: Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.3.4; RI.4.4; RI.5.4; RI.6.4; RI.7.4; RI.8.4 Determine the meaning of general academic words and phrases in a grade level text and describe how these words and phrases shape text.

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings

SOCIAL STUDIES

4.1.Q.1 Migration and Settlement. Ask Compelling questions about migration and settlement.

4.G.MM.1 Migration and Movement. Compare the distinctive cultural characteristics of groups that immigrated or were brought forcibly to the United States from other nations from European Exploration to the Thirteen Colonies.

4.G.HI.1 Human Interaction and Interconnections. Explain how cultural, economic and environmental characteristics affect the interactions of people, goods and ideas from European Exploration to the Thirteen Colonies.

4.H.CH.1 Describe how migration and settlement impacted diverse groups of people as they encountered one another from European Exploration to the Thirteen Colonies. Describe how cultural and environmental changes can impact population distribution and influence how people modify and adapt to their environments. (Depending on proximity to water and natural resources, people have altered the environment for means of survival and economic benefits, among other motivations.)

5.G.HI.1 Human Interaction and Interconnections. Describe the traditions diverse cultural groups brought with them when they moved to and within the United States.

5.G.HI.2 Human Interaction and Interconnections. Analyze how and why cultural groups brought with them when they moved to and within the United States.

5.E.KE.1 Analyze how incentives and opportunity costs impact decision making using examples from Kentucky History.

7.H.CH.1 Indicate changes resulting from increased interactions and connections between Afro-Eurasia and the Americas between 1450 -1600. (i.e. This time brought diseases to the Americas, and it was a time of frantic land grabs in an era when wealth was most often defined by land ownership.)

7.G.HI. 2 Human Interactions and Interconnections. Examine ways in which one culture can both positively and negatively influence another through cultural diffusion, trade relationships, expansion and exploration.

8.H.CH.6 Analyze the impact of fundamental documents and speeches on the development of the United States from 1600-1877.

8.H.KH.1 Articulate Kentucky’s role in early American history from the earliest colonial settlement of 1877.

8.H.KH.2 Examine patterns of collaboration and conflict between immigrants to Kentucky and those already in residence from 1775 to 1877.

8E.KE.1 Explain how regional trends and policies impacted Kentucky’s economy prior to the Civil War.

VISUAL ARTS

(This lesson presents opportunities such as making a “crazy quilt” from paper scraps and building a flatboat model.)

Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work..

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: Cr2.2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

STEWARDSHIP

5-ESS3.C Human Impacts on Earth Systems. Human activity in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individual communities are doing things to help protect Earth’s resources and environments.

5-ESS3-1 Obtain and combine information about solutions individual communities use to protect the Earth ‘s resources and environment.

5-ETS1.A: Defining and Delimiting Engineering Problems. Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared based on how well each one meets the specified criteria for success or how well each takes the constraints into account.

8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 7: Kentucky River Water Trail

Lesson Goal: To develop an understanding of the Kentucky River water trail. A water trail consists of marked routes on navigable waterways such as rivers, lakes, canals, and coastlines. A water trail is to the water what a hiking trail is to the land, such both can be used recreationally. The Kentucky River water trail in its beauty has been compared (by Kentucky Ecotourism) to Arizona’s Grand Canyon and Europe’s Rhine River, such its beauty is highlighted in this lesson.

READING

RI.3.1: Ask and answer questions, and make and support logical inferences in order to construct meaning from text.

RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.6.1: Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.7.1: Cite pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.8.1: Cite relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

RI.3.4; RI.4.4; RI.5.4; RI.6.4; RI.7.4; RI.8.4 Determine the meaning of general academic words and phrases in a grade level text and describe how these words and phrases shape text.

COMPOSITION/LANGUAGE

C.3.3 Compose narratives, using writing and digital resources, to develop real or imagined experiences or multiple events or ideas using effective techniques, descriptive details and clear sequence.

C.4.2 Compose informative and/or explanatory texts, using writing and digital resources, to examine a topic and convey ideas and information clearly.

C.5.3; C.6.3; C.7.3 Student will compose narratives to develop real or imagined experiences or events, using effective technique, well-chosen details and well-structured event sequences.

L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

VISUAL ARTS

(This lesson features activities such as completing a puzzle of the flora and fauna that can be found on the Kentucky River water trail. They could choose to draw a picture of the Kentucky River adding drawings of fauna, flora, towns and other natural features that can be found on the Kentucky River water trail.)

Anchor Standard 1.1; 2.1 Generate and conceptualize artistic ideas and work.

VA: Cr.1.1.4) Brainstorm multiple approaches to a creative art or design problem.

VA: Cr.1.1.5) Cobine ideas to generate an innovative idea for art making.

VA: Cr1.2) Collaboratively set goals and choose appropriate materials to create artwork that is meaningful to the makers.

VA: Cr.1.2.5) Apply informed artistic investigation when choosing an approach for planning and creating a work of art.

VA: .2.1.4) Develop skills in multiple art-making techniques and approaches through guided practice.

VA: Cr2.1.5) Develop skills in multiple art-making techniques and approaches through student led experimentation.

VA: Cr.1.1.6) Combine concepts collaboratively to generate innovative ideas for creating art.

VA: Cr.1.1.7) Identify and apply methods to overcome creative blocks.

VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

STEWARDSHIP

5-ESS3.C Human Impacts on Earth Systems. Human activity in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. But individual communities are doing things to help protect Earth's resources and environments.

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8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 8: The Kentucky River Water Cycle

Lesson Goal: While students usually learn about the water cycle in early grades, there is a rationale for why the topic is included in this curriculum. We aim to develop a more global thinking about the water cycle as it applies to the Kentucky River watershed, the state, the country, and globally. Students will learn that there is no new freshwater on earth. The water we already have keeps moving through the steps of evaporation, condensation, precipitation, and collection in the water cycle. Students will learn that our actions, such as pollution of the river are likely not only affecting the river’s watershed, but that its effect can reach across the world and affect everybody’s resources. The overall goal is to develop not only to think locally, but to think globally.

READING

RI.3.1: Ask and answer questions, and make and support logical inferences in order to construct meaning from text.

RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

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COMPOSITION/LANGUAGE

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L.2.1; L.3.1; L.4.1 Students will demonstrate command of the conventions of standard English grammar and usage when speaking and writing.

L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

SCIENCE

5-ESS2-2.C The roles of water in Earth's Surface Processes-Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

6-ESS2.C: The Roles of water in Earth Surface Processes. Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. Global movement of water and its changes are propelled by sunlight and gravity. (Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle.)

VISUAL ARTS

(Students can choose to design a diagram of the water cycle specific to the Kentucky River watershed. They could design and build a terrarium, or they could design a poster illustrating the water cycle.)

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VA: Cr.1.1.8) Document early stages of the creative process visually and/or verbally in traditional or new media.

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8-ETS1.B: Developing Possible Solutions. There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of problems.

Lesson 9: Kentucky Loch and Dam System

Lesson Goal: We want to help students understand that, as stated by Greer (2001, *The Five Lives of the Kentucky River*), "A river is a living creature. It has personality and feelings, moods, and its own life." The first people used the river as a place to settle, build their own villages, raise their crops, and as a water path for travel and trade. The early settlers also used the river to travel up and down the river to reach the fertile Bluegrass area. The wild,

untamed river was shallow for much of the year and unpredictable. During the spring tides it was navigable during the spring “tides” (floods). Canoes were the vessels of choice before the locks were built. These small vessels could be lifted and portaged around obstacles and shallow areas. Locks allowed the use of larger vessels.

READING

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L.5.5; L.6.5; L.7.5; L.8.5 Demonstrate understanding of word nuances in word meanings.

SOCIAL STUDIES

4.G.KGE.1 Kentucky Geography. Compare how the movement of people, goods and ideas in Colonial America and modern Kentucky were affected by technology.

4.G. GR.1 Geographic Reasoning. Analyze how location and regional landforms affect human settlement, movement and use of various national resources, using maps, photos and other geographic representations.

5.G.HE.1. Explain how cultural and environmental changes impact population distribution and influence how people modify and adapt to their environments. Throughout U.S. history there have been geographic push and pull factors that have influenced the movement of people. Depending on proximity to water and cultural resources, people have altered the environment for means of survival and economic benefits, among other motivations.

5.G.GR.1. Use a variety of maps, satellite images and other models to explain the relationships between the location of places and regions and their human and environmental characteristics. In the early United States, many larger cities developed in areas where the geographic location made trade easier, especially near oceans, rivers and other waterways.

6.E.IC.1. Analyze the economic choices of individuals, societies and governments. The choices made by individuals, societies and governments were influenced by geography, culture and societal norms.

8.E.KE.1 Kentucky Economics. Explain how regional trends and policies impacted Kentucky's economy prior to the Civil War.

8.E.KE.2 Kentucky Economics. Explain how the availability of resources in Kentucky led people to make economic choices from the Colonial Era to Reconstruction from 1600-1877.

VISUAL ARTS

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STEWARDSHIP

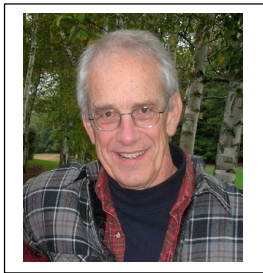
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Special Contributors



Harry G. Enoch

Retired PhD biochemist from Mt. Sterling, KY
history researcher with a focus on Clark County, Boonesborough and Kentucky River



Judy Sizemore

Judy Sizemore, Arts Education and Cultural Research Consultant for the Kentucky Arts Council, Kentucky Archaeological Survey, and the Kentucky Folklife Program.



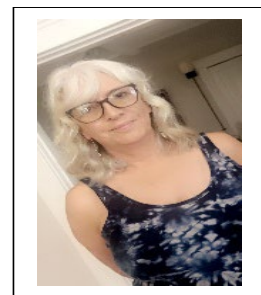
Susan Mullins

Susan tries to leave children and adults who participate in the Native Nations program with the desire to learn about their own heritage and to compare the differences in cultures. She is a Kentucky Arts Council roster artist, PRI (Partners for Rural Impact) Arts and Humanities programs. She is A Commission on the Native American Heritage Commission for the State of Kentucky.



Mary Hufford

PhD. Director of stories of Place , LiKEN. Photo by Peggy Bone



Teri Williams

Editor
Kentucky Riverkeeper, Administrative Assistant
Community Organizer, Environmentalist, Animal Resue
Mother and Grandmother

Thank you to so many others for their thoughts and support of this project!



Pat Banks
Artist, Kentucky Riverkeeper

Discover the Kentucky River Watershed through History, Science, Art, Culture, Conservation, Recreation and Education, has been a journey for me. I have learned so much from so many people and have been touched by so many joys and sorrows. The weaving of this collection of disciplines to explore our watershed is complicated, but I hope it helps uncover and reconnect us with our past and illuminate our collective path forward. I hope we, Roberta Hounshell and I, in some small way help our children and community feel their connection to this magical place. Remember “We protect what we love”.

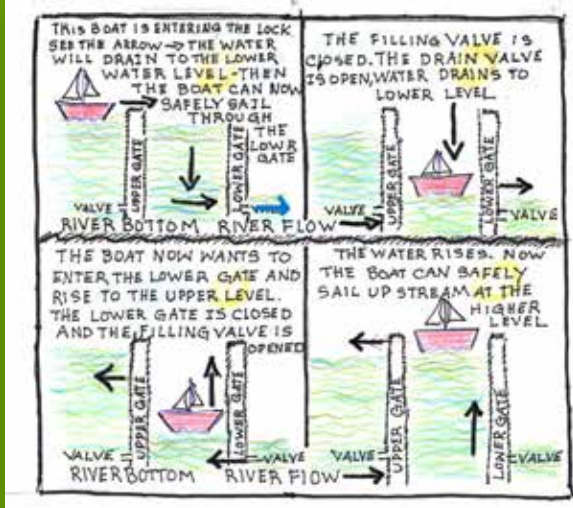
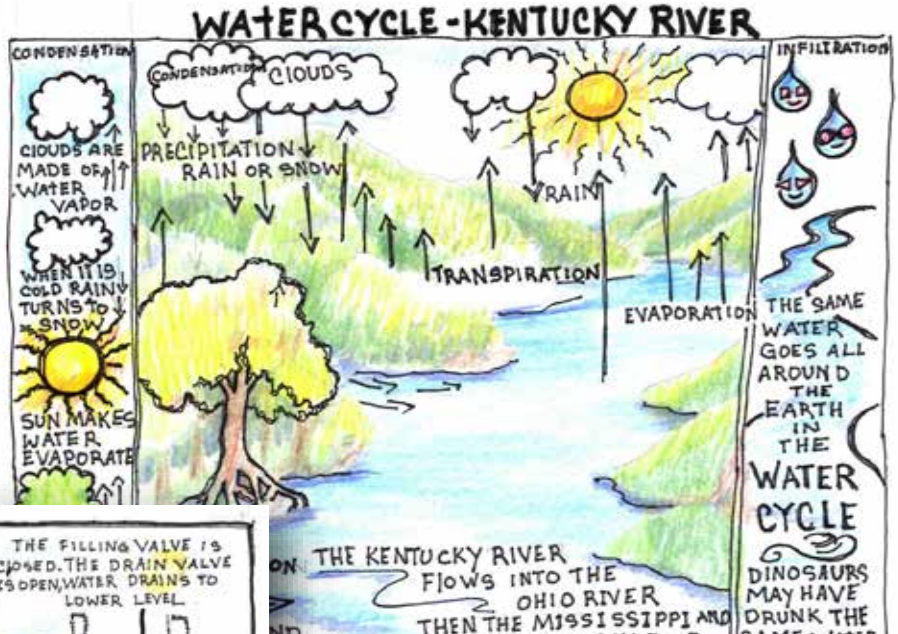
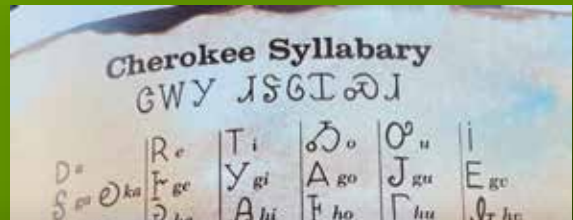
Pat is a Signature Member of the Kentucky Watercolor Society, Kentucky Guild of Artists and Craftsmen member, a Kentucky Arts Council Roster Artist, and a Kentucky Arts Council, Craft Marketing program juried participant, founding member of the Gallery on Main, Director of the Kentucky Riverkeeper, and artist teacher.



Roberta Hounshell BA,MS,Director of Special Education, Rank 1, Teacher and Educator

Teacher, Director of Special Education My entire career was dedicated to working with students with special learning needs. I started my education at the University of Cologne in Germany. To experience an educational exchange, I moved to Barbourville, Kentucky, where I earned my teaching certification for Kentucky and a master’s degree. After my move to Lexington, Kentucky, I pursued a Rank I certification and my certification as Director of Special Education. I worked in that position for 13 years and was part of curriculum development. We worked to make content more accessible and engaging for students with special learning needs by addressing a variety of learning styles and by incorporating student interests and strengths.

Pat Banks, the director of the Kentucky Riverkeeper, and I have been friends for many years. This friendship led me to join the Kentucky Riverkeeper organization and to strengthen my interest in environmental issues, especially in my elected home state Kentucky. We aimed to develop an engaging environmental curriculum that addresses student strengths, interest and learning modes. The curriculum is geared to ignite a passion in students to become stewards



ON THE KENTUCKY RIVER FLOWS INTO THE OHIO RIVER THEN THE MISSISSIPPI AND



This collection of lesson plans, stories and projects explore the Kentucky River Watershed through the lens of science, history, arts, culture, conservation, recreation, and education. To support the lesson plans we have collected and created handouts, projects, and experiences to enhance, illustrate, illuminate, inform, and engage the students senses and spark their creativity and curiosity. Project of the Kentucky Riverkeeper Pat Banks , Kentucky RIVERKEEPER, Artist