

Day 3

People on the river

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Introduction

This day focuses on the many ways we use rivers:

- **Social:** gathering place, food, river as boundary, inspiration for music/poetry, art, architecture
- **Economic:** transportation, food, industry (logging, shipping), power generation (hydropower)
- **Recreational:** boating, swimming, fishing, rafting, bird watching

Questions to guide explorations and experiments

- What do you like to do at or on the river?
- What do you think it would be like to go on a boat?
- How do rivers act as boundaries or borders?
- How do people use rivers?
- How do rivers build communities?
- How do rivers inspire people?
- What happens to a river when people use it?
- How do hydroelectric power plants impact rivers?
- How do dams impact wildlife in and around the rivers?
- Can people use rivers and care for them at the same time?



Books and activities

- **Books:** social, economic, and recreational uses of rivers — today and in the past.
- **Activities:** recreation, inspiration, transportation, and energy (hydroelectric power).



Children's Books

Fiction

- *The Boats on the River* by Marjorie Flack (Gr K-2)
- *The Boxcar Children: Houseboat Mystery* by Gertrude Chandler Warner (Gr 1-5 listening, Gr 3-5 reading)
- *Heat Wave* by Eileen Spinelli (Gr 1-3)
- *The Dam Keeper (graphic novel)* by Robert Kondo (Gr 3-5)
- *Letting Swift River Go* by Jane Yolen (Gr 1-3)
- *McElligott's Pool* by Dr. Seuss (Gr 1-3)
- *Mr. Gumpy's Outing* by John Burningham (Gr K-2)
- *Paddle to the Sea* by Holling C. Holling (Gr 3-5)
- *The Raft* by Jim La Marche (Gr 2-5)
- *River* by Debby Atwell (Gr 1-5)
- *A River* by Marc Martin (Gr 1-5)
- *Three Days on the River in a Red Canoe* by Vera Williams (Gr 2-5)
- *The Wind in the Willows* by Kenneth Graham (Gr 3-5)

Poetry

- *River of Words: Young Poets and Artists on the Nature of Things* edited by Pamela Michael (Gr 5)
- *The Negro Speaks of Rivers* by Langston Hughes (Gr 3-5)

Nonfiction

- *10 Rivers That Shaped the World* by Marilee Peters (Gr 3-5)
- *Bridges Are to Cross* by Philemon Sturges (Gr 1-5)
- *Caught in the Rapids — Can Science Save Your Life?* by Felicia Law and Gerry Bailey (Gr 2-5)
- *The Great St. Lawrence Seaway* by Gail Gibbons (Gr 2-5)
- *The Hoover Dam* by Elizabeth Mann (Gr 3-5)
- *One Well: The Story of Water on Earth* by Rochelle Strauss (Gr 3-5)
- *River of Dreams: The Story of the Hudson River* by Hudson Talbott (Gr 3-5)
- *River Town* by Bonnie Geisert (Gr 1-3)
- *White Water! True Stories of Extreme Adventure* by Brenna Maloney (Gr 3-5)



Water Words

Barge

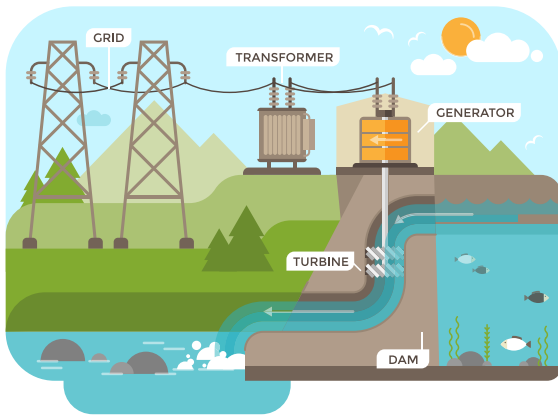
A large, long boat with a flat bottom used for carrying heavy loads, especially on rivers and canals.

Canoe

A narrow boat with pointed ends that is moved through the water with a paddle. Native American in origin. Canoes are open on top.

Dam

A bank, wall, or barrier built to block the flow of water in a stream or river, often forming a lake or reservoir. Dams are usually built to prevent flooding or produce hydroelectric power.



Hydroelectric power

Energy generated by turbines driven by water falling down from a height.

Kayak

A narrow boat like a canoe, used by the Inuit people and for river sports. Kayaks are covered on top.

Levee

A raised bank alongside a river to keep the river from flooding the land.

Logging

Cutting down, transporting, and selling trees as building lumber or firewood.

Paddle board

A long narrow surfboard, with a paddle for motion and steering. Stand up paddle boards are popular now!



Raft

A floating platform often made from large pieces of wood tied together or other materials that float.

Reservoir

A man-made lake used to store water for irrigation and the water supply in towns and cities.

Shipping

The transportation of cargo or goods as a business, especially on ships.

Turbine

A machine or engine which uses air, gas, water, or steam to turn a wheel and produce power.

Waterfront

The land on the edge of a body of water; the area of a city or town on the edge of a river, lake, or ocean.

Waterwheel

A wheel turned by the weight of falling or running water, creating power to operate machinery.



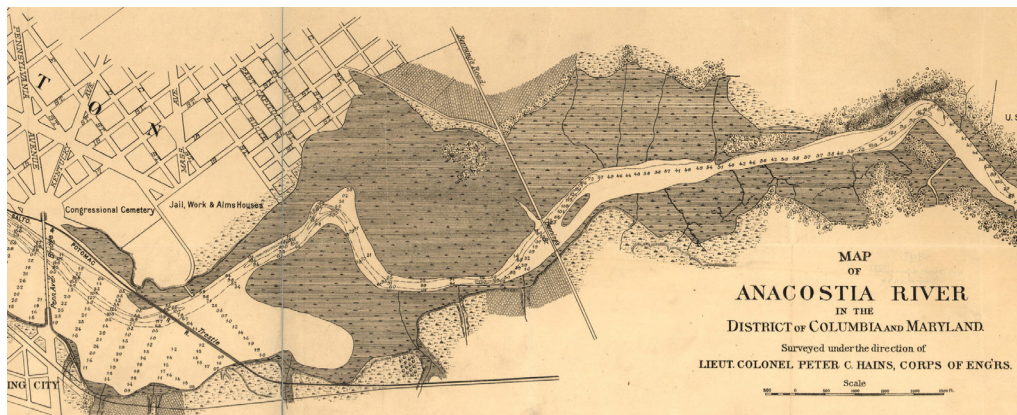
Anacostia & Potomac Connections

When kids see the connections between what they read about and their own local communities, the information is more relevant to them and expands their background knowledge about the world. Browse these links to learn more about the history of the Anacostia and Potomac rivers and how people have used these waterways over time.

Anacostia Waterfront Trust timeline

<https://www.anacostiatruster.org/anacostia-trust/2015/10/15/the-anacostia-in-history>

The lower Anacostia basin was a native American crossroads, and for hundreds of years before the coming of the Europeans had been the home of a group of native Americans known today as “Nacotchtanks”, whose principal village was near the river’s mouth.



Anacostia Waterfront Trust vignettes for Black History Month

<https://www.anacostiatruster.org/anacostia-trust/2018/2/8/ten-vignettes-about-the-anacostia-river-corridor-for-black-history-month>

Both free and enslaved African Americans were important actors in DC history during its first decades. Free black craftsmen were employed at the Navy Yard in the early 1800s, and both free blacks and enslaved workers helped to build the Capitol and other great government buildings.

History of the Anacostia (*The Washington Post*)

https://www.washingtonpost.com/lifestyle/magazine/anacostia-river-from-then-till-now/2011/08/08/gIQARrdT7K_story.html?utm_term=.d57d67c24769

In June 1608, John Smith sailed up the Chesapeake Bay to the Potomac and its eastern branch, what would become known as the Anacostia. Buffered by thick forests, the Anacostia was 40 feet deep as far north as what is now Bladensburg, and Smith marveled at its clarity.



Anacostia & Potomac Connections

George Washington used ice from the Potomac to make ice cream

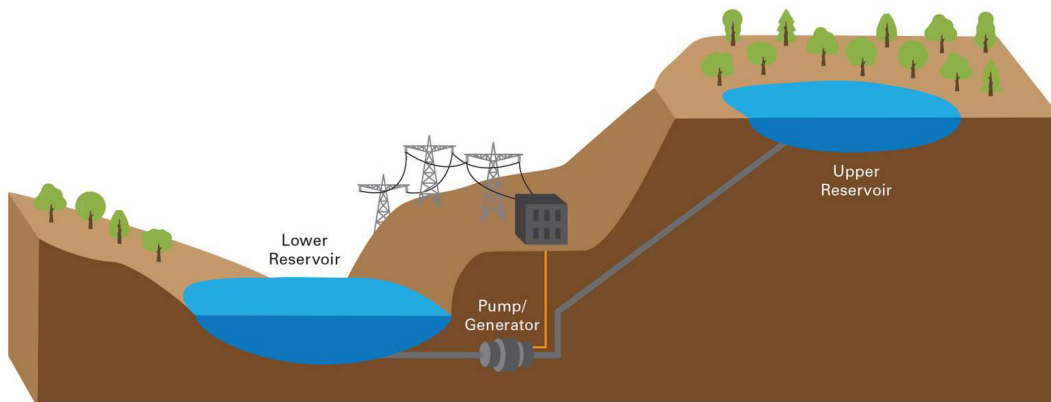
https://www.washingtonpost.com/lifestyle/kidspost/ice-cream-ruled-even-centuries-ago/2014/08/14/98ded3cc-2172-11e4-8593-da634b334390_story.html

George and Martha Washington regularly served ice cream to guests at Mount Vernon during the summer months, but it was a much bigger treat in the 18th century than it is today. The Washingtons had blocks of ice from the Potomac River stored in the estate's ice house, but there was no guarantee how long it would last.

Hydroelectric Power in Virginia (Bath County "Pumped Storage Station")

<https://www.dominionenergy.com/about-us/making-energy/renewables/water/bath-county-pumped-storage-station>

The earth and rock fill moved to construct the dams and other project facilities, if piled up, would create a mountain 1,000 feet high! The recreation area has facilities for fishing, boating, picnicking, swimming, hiking, and camping.



Hydroelectric Power in Maryland (Conowingo Hydroelectric Station)

<http://www.exeloncorp.com/locations/power-plants/conowingo-hydroelectric-generating-station>

When the Conowingo Dam was completed in 1928, producing 252 megawatts, it became the second largest hydroelectric project in the United States, after Niagara Falls. A fish lift was completed in the early 1990s and has helped to restore more than 1 million American shad to the upper Susquehanna River.

The Conowingo Dam has environmental issues. The reservoir behind the dam is full of sediment and pollution. Powerful floodwaters or a hurricane could release this sediment pollution directly into the Chesapeake Bay. Read more about it here: <http://ow.ly/eVCi30keufd>



Activity 1: Craft a Raft

Introduction

Give kids the experience and satisfaction of crafting a sea-worthy craft from wood.

Supplies

- Lengths of straight, dry (seasoned) sticks (12 to 20 sticks per child)
- Yarn or string
- Cutting tool (for evening the lengths of sticks and cutting string)



Let's get started!

To build a natural boat from wood, head out into nature! Gather straight, dry sticks that can lie together to form a raft. You can even build your craft outside if you bring a cutting tool and string with you. You may even want to plan to do this if where you gather your wood there's also an accessible body of water for boat testing and launching.

As you gather sticks, talk about the river books you've read together (*The Raft* is an especially good book for this activity). Ask kids what kind of adventures they'd like to have on the water. Think aloud together about things besides travel and recreation that we depend on rivers for, such as drinking water, animal habitats, and even electricity.

Also talk with kids about how raft size depends on the size of the sticks. Sticks that are 10 to 12 inches long may be easiest to work with. If you don't have a ruler or tape measure, estimate stick length with a known standard, such as a dollar bill (6.14 inches). Most of your sticks should have a similar diameter — that's what determines how big around they are. However, you'll want to choose two sticks that have a diameter at least twice that of all the others — these will be used as the cross pieces to tie the smaller sticks to. See the next page for a diagram.



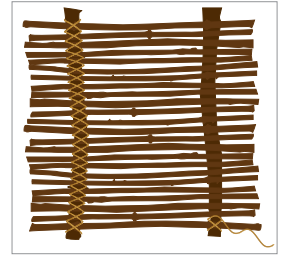
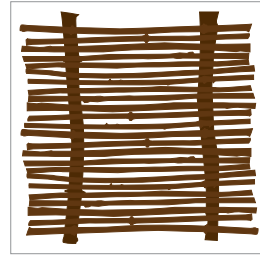
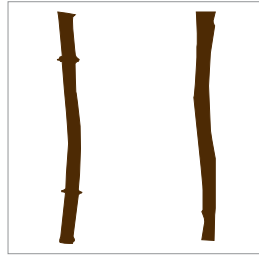
Activity 1: Craft a Raft

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Lining things up

Once you have your sticks, lay them side-by-side. If the sticks are small and quite dry, kids may be able to break off ends to bring them all to a similar length. Otherwise, you should use a cutting tool to even them out. Then take the two sticks with the larger diameter and place them parallel to each other, less than one stick length apart. Lay your other sticks perpendicular to the parallel sticks, letting them overlap the larger sticks about an inch. Gather more sticks if needed or trim your parallel sticks down to size.

Help kids knot a long piece of string around one end around the end of the first perpendicular stick (the thicker one). Wind the string under and around the parallel stick so that the sticks are secured together. Continue winding addi-



tional sticks until all sticks are secure. The sticks that have been laid out won't stay in place until they are tied; so reassure kids that it is okay if the original layout is not maintained while tying takes place. Repeat tying stick lengths to the other perpendicular stick. Try to pull the sticks tightly together as you wind the string around.

Time now to test the waters! If kids want to keep their rafts, make sure you are testing in water that allows you to safely and easily retrieve the craft. Otherwise, make note of water currents, have kids make predictions about where boats will float, and wish them bon voyage!

Variation: Indoor rafting. Rafts can also be built from Lincoln Logs® or Popsicle sticks® and launched in the bathtub or sink.

More boat making activities

Make a rubber band paddle boat (PBS Design Squad)

<http://pbskids.org/designsquad/build/paddle-power/>

Make "little drifters" — art boats made from natural materials (Make Magazine)

<http://pbskids.org/designsquad/build/paddle-power/>



Activity 2: Build a Water Wheel

Introduction

Harnessing the energy of running water can help humans with a variety of tasks. Let kids experiment with converting the energy of water into power by having them engineer a water wheel.

Supplies

- Water source — faucet and sink or a gallon jug of water and a way to refill it
- Basin for catching water
- Disposable plastic plates or aluminum pie plates, small plastic cups, plastic or wooden spoons, straws, empty 2-liter bottles, balsa wood, foam egg cartons, yogurt cups
- Bamboo skewers and/or dowel rods
- Scissors
- Glue and/or staples, paperclips, thumbtacks
- Pencil and paper

Let's get started!

A water wheel is a large wheel that turns when water is poured over it. The wheel spins to produce energy. If kids have never seen a waterwheel, show them one in action:

[Murray's Mill Catawba, North Carolina Water Wheel](https://www.youtube.com/watch?v=3nUhQVRNjfw)
<https://www.youtube.com/watch?v=3nUhQVRNjfw>

[Saugus Iron Works Water Wheel](https://www.youtube.com/watch?v=EytzKIR6G70)
<https://www.youtube.com/watch?v=EytzKIR6G70>

[Homemade waterwheel](https://www.youtube.com/watch?v=xzuhRhedIM4)
<https://www.youtube.com/watch?v=xzuhRhedIM4>



Talk about what you watched. **Ask kids:** How do water wheels work? What parts do they have and what does each part do? Why do people build water wheels? Where do you think people build them?



Activity 2: Build a Water Wheel

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Get kids thinking about how they would design a water wheel with the materials you have available. Have paper and pencil handy for brainstorming and sketching out ideas. Let kids dive into building materials and construct prototypes, considering important questions, such as: Will water flow over or under the wheel? Encourage testing as they go — making sure, for example, that their wheel spins.

Then put the water wheel to the real test: pour on the water! How did their design hold up?

Talk about what kids have engineered. **Ask kids:** How could the waterwheel be used in real life? What could be done to improve their design? Have kids reflect and continue to refine their water wheels.

More water wheel activities

Water wheel (Green Kid Crafts)

<https://www.greenkidcrafts.com/water-wheel/>

Milk carton water wheel (PBS Kids Zoom)

<http://pbskids.org/zoom/activities/sci/waterwheel.html>

Egg carton water wheel (iGame Mom)

<https://igamemom.com/off-screen-with-app-water-wheels/>

Water wheels: energy transformations and rotational rates (Teach Engineering)

https://www.teachengineering.org/activities/view/cub_energy2_lesson08_activity2

More information about water wheels

What Is a Water Wheel? (Wonderopolis)

<https://wonderopolis.org/wonder/what-is-a-waterwheel>

Waterwheels: Facts for Students

<https://www.forteachersforstudents.com.au/site/themed-curriculum/water-wheels/facts/#howwork>



Photo © Green Kids Crafts



Activity 3: River Boundaries

Rivers as boundaries

Throughout history, governments have used physical features (mountains, deserts, oceans and rivers) as "political" boundaries, separating and defining countries and states. Rivers make up about one-fifth of the world's political boundaries.

Examples in the U.S.: The Rio Grande forms a large part of the boundary between Mexico and the United States. The Mississippi River is the boundary between many of the states it winds through, including Iowa and Illinois, Arkansas and Tennessee, and Louisiana and Mississippi.

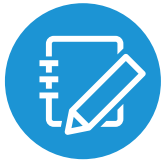
Activity: Look at U.S. maps and world maps. Show kids how rivers are indicated on the maps, and ask them to find examples of rivers that form boundaries between countries or between states in the U.S.

Ask kids: Rivers do not make perfect boundaries. Can you think about why? (They seem permanent on a map — but rivers do change their course over time!)

Examples of boundary rivers

We've listed a few book connections below. Ask your librarian about other books featuring rivers in the story.

- Limpopo River: South Africa and Zimbabwe (*The Elephant's Child* by Rudyard Kipling)
- Ganges River: India and Bangladesh
- Jordan River: Israel and Jordan
- Amazon River: Colombia and Peru (*Afternoon on the Amazon* by Mary Pope Osborne)
- Rhine: Germany and France
- Niagara River: United States and Canada
- Rio Grande: New Mexico, Texas, and Mexico
- Mississippi River: Minnesota, Wisconsin, Iowa, Illinois, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, and Louisiana (*Minn of the Mississippi* by Holling C. Holling)
- Colorado River: Arizona, Nevada, California, Baja California (*Grand Canyon* by Jason Chin)
- Potomac River: Maryland, Virginia, D.C., West Virginia



Writing about Rivers

Writing helps kids process and solidify new knowledge and gives them an opportunity to use new vocabulary and concepts. Offer one or more of these prompts or questions to get your River Rangers writing.

Writing prompt

Try to see the world from a river's point of view when you interview a river! Imagine that you could ask a nearby stream or river a few questions. You might start with questions you can find real answers to, such as "How old are you?" and "What events have you seen in your life?" Think of other questions that you can imagine answers for, such as "Who comes to visit you?" or "What is your job?"

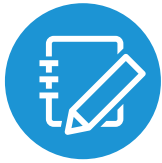
Journal writing

- When you visit a river, interview other people you meet there about how they use the river.
- Think of a story you want to tell about a river. Use your story to change the words to a popular song to create your own song about a river. (See the next page for details)



Play with words

Share your river story. American Rivers and partners are collecting 5,000 personal river stories to highlight the many ways rivers touch our lives. <https://www.5000miles.org/share-your-story/>



Writing about Rivers

River music

Rivers make beautiful music. From the trickle of melting snow to the babble of a full-flowing stream to the cascade of water over boulders and stones, the sounds and rhythms of the river can sooth and invite. A river can also make harsh tones, like when it floods and spills over its banks.

In this writing activity, you'll encourage kids to channel their own feelings about rivers into a song or rap.

Talk with the kids about inspiration. Why would a river stimulate creativity and excite someone to write a song? What characteristics does a river have that would be interesting or entertaining to hear about in a song?

If you've visited a river together, encourage kids to write down thoughts about the experience. If you haven't made your own visit, kids can be inspired by the books you're reading.

Look for a simple story to tell, and that story becomes the song lyrics.

To generate a melody, try just singing the words and see what comes out! Or borrow or modify another folk song, such as "Over the River and Through the Woods" or "I've Been Working On the Railroad." Kids can also generate ideas by listening to other songs or raps:

Playlist of Best River Songs (American Rivers)

www.youtube.com/view_play_list?p=AAC05D7C64C61568

Bluegrass music about rivers

<http://ow.ly/Rha930ju3JA>

Jazz music about rivers

<http://ow.ly/is6R30ju5pM>

Rap song for learning about U.S. geography, including rivers (Rhythm, Rhyme, Results)

www.educationalrap.com/song/geography-in-the-usa.html

Now it's time to perform! Gather everyone together (down by the river if you can) and put on a lively sing-a-long show.

Music inspired by water and rivers

Vivaldi's 4 seasons

Handel's Water Music

Row Row Row Your Boat

Proud Mary

Shenandoah

Jordan River

Down to the River to Pray

Moon River



Kid-friendly websites and apps

Websites

Why We Need Wild Rivers (American Rivers)

<https://www.americanrivers.org/threats-solutions/protecting-rivers/the-value-of-wild-river/>

Documentary Films (American Rivers)

<https://www.americanrivers.org/rivers/films/>

Find Your River (National Park Service)

<https://www.nps.gov/subjects/rivers/find-your-river.htm>

Rivers (National Geographic)

<https://www.nationalgeographic.com/environment/freshwater/rivers/>

10 Most Important Rivers in the World (Touropia)

<http://www.touropia.com/most-important-rivers-in-the-world/>

We All Use Water (Project WET)

<http://www.discoverwater.org/we-all-use-water/>

Building Big: Dams (PBS)

<http://www.pbs.org/wgbh/buildingbig/dam/index.html>

The Best Dam Simulation Ever (OMSI)

<https://omsi.edu/exhibitions/damsimulation/>

Restoring Damaged Rivers Through Dam Removal (American Rivers)

<https://www.americanrivers.org/threats-solutions/restoring-damaged-rivers/>

What's Good and What's Bad About Hydropower?

<https://www.kidsdiscover.com/teacherresources/whats-good-and-whats-bad-about-hydropower/>

Educational apps

WWF Free Rivers

<https://www.commonsemmedia.org/app-reviews/wwf-free-rivers>

Village Farm Dam Construction

<https://play.google.com/store/apps/details?id=com.onetengames.village.farm.dam.construction>



Outings in the DC Area

Introduction

Visiting a river or stream is a fun experience and a rewarding activity for both kids and grownups, but anyone visiting should be aware of potential hazards and follow safety guidelines. Before you head to the river, make time to review water safety.

Water Safety: Rivers and Streams provides helpful resources, hazards to avoid, and tips that could save your life.

https://www.recreation.gov/marketing.do?goto=acm/Explore_And_More/exploreArticles/water-safety-rivers-and-streams.htm

Places to visit

Anacostia River Explorers Boat Tours

<https://anacostiariverkeeper.org/anacostia-river-explorers-tours/>

Anacostia River Discovery

<https://www.anacostiaws.org/events-and-recreation/signature-events/anacostia-river-discovery-series.html>

Anacostia River Trails

https://www.anacostiaws.org/images/Files/maps/2017_Update_ART_web.pdf

Year of the Anacostia Events (free and \$)

<https://www.yearoftheanacostia.com/events>

Boating In DC \$

<http://boatingindc.com/>

Potomac River Guide

<http://www.riverexplorer.com/index.html>

Potomac Riverboat Company \$

<https://www.potomacriverboatco.com/>

National Harbor

<https://www.nationalharbor.com/>



Outings in the DC Area (continued from previous page)

The Wharf and the Fish Market

<https://www.wharfdc.com>

<https://www.wharfdc.com/fish-market/>

C & O Canal Towpath and Locks in Georgetown

<https://www.nps.gov/nr/travel/wash/dc6.htm>

Pierce Mill, Rock Creek Park

<https://www.nps.gov/places/peirce-mill.htm>

<http://www.friendsofpeircemill.org/>

Old Town Alexandria

<https://www.visitalexandriava.com/old-town-alexandria>

Mount Vernon \$

<http://www.mountvernon.org/>



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