River Rangers!

A book-based adventure for kids 6-10 years old

Explore, read, play, invent, build and learn —
all about water and the rivers
in your community

Brought to you by Reading Rockets, with support from the Park Foundation

PARK FOUNDATION

River Rangers!

A book-based adventure about water and rivers

Contents

Welcome to River Rangers!

The best way to get kids learning is to build on their curiosity and interests. The River Rangers program is kid-centered with an emphasis on inquiry and creativity.

We've designed the program to be user-friendly and adaptable. Use the materials each day for five days in a row, or once a week, for five weeks, (or any other way you like) to add hands-on learning to your summer programming.

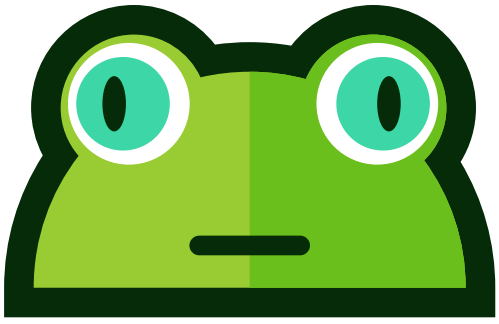
Day 1: How rivers are formed

Day 2: River habitats: who lives here?

Day 3: People on the river

Day 4: The water in my cup

Day 5: Protecting our water



Getting yourself ready

- You'll find an introduction to the concepts covered and recommended books for each day, as well as a list of questions to guide explorations and experiments, and a list of "water words" that kids might not be familiar with.
- Start by gathering books from the list provided from your library.
- Choose fiction and nonfiction books from the list provided.
- Read them through before you read them to the kids so you know what happens, can spot any unfamiliar words or concepts you'll need to explain. Also, look for places to ask questions while you're reading to engage listeners.

- Think about which other parts of the program you'd like to do after reading the book(s). An activity is always a good idea, but you may also want to include writing, exploring related websites and apps, and going on a field trip, too.

Learning with the kids

- **Introduce the theme** for the day and ask kids what they know about it. (See "Activating background knowledge" on the next page.)
- **Read one or more of the books aloud and ask questions.** Listen carefully to the kids' answers. By reading to them and asking questions, you'll get them thinking about the topic, and what they want to learn. You'll also increase their understanding and excitement. Read another book and repeat.

For tips on reading aloud and sharing nonfiction books with kids, see page XX.

- **Choose a hands-on activity** to let kids explore theme. By doing an activity, the kids get to use the concepts and new words they have learned.
- **Look for a local connection.** How can you connect the ideas in the books or the activities with the kids' personal experience? Think about the closest river, stream, or creek.
- **Keep asking questions** throughout and listening carefully to your kids' answers.

- **Encourage kids to write** about what they are learning or curious about by using one of the writing prompts in this booklet.
- **Provide access to books about the topic** for kids to look at on their own.
- **Show kids websites and apps** that they can use to learn more about the topic and give kids time to try them out.
- **Take a field trip** to one of the recommended locations to further explore your topic for the day or theme for the week.

You can choose any of the components, all of them, or just one or two, but we recommend that you **always Start With a Book**.

Connecting the days and concepts

Ideally, you'd look through all five days of materials in advance and map out which books and activities you'd like to do. That will make it easier to help kids connect the ideas and activities each day, creating a big picture. You don't have to implement all five days, but if you do, it will make a stronger impact if you help kids connect what they are learning from day to day.

Activating background knowledge

Ask kids what they know about the topic when you are getting started. For example:

- Have you ever been to a river? What did you do there?
- Where do rivers come from?
- Where does water come from?
- Why does water flow? What is surface tension?
- Why does it rain or snow?

You can use some of the questions from the "Things to investigate list" if you like. Reading books and talking about them is another great way to activate kids' background knowledge.

Review big ideas from the day before and then make a connection.

> "Yesterday we talked about the water cycle, where we find water, and how water changes throughout the seasons.

Today we're going to look at how water collects and helps things live.

So water might fall as rain or snow in the water cycle, and end up running into a river. Let's look at how water gets to the river and what lives there."

This is a great time to check to see if your kids understood the ideas you introduced the day before, answer their questions, or identify things they'd like to explore more.

Review and teach new words

When you are pre-reading your books or looking at activities, websites, apps, or field trips, look out for words kids might not know. Take time to talk about those words and tell kids what they mean. You can do this before you read or do an activity or while you are reading or working hands-on.

If words or concepts are being repeated, ask kids if they remember what they mean and how they might be used the same way or differently in this new context.

Acknowledgements

Thank you to the following DC Metro organizations and staff for their expert review of the River Rangers toolkit.

These organizations offer educational resources and programming for children, to support our youth in becoming active stewards of our freshwater rivers and watersheds. Visit them online to explore more!

Anacostia Watershed Society
Chris Lemieux, Manager of Education
Website: https://www.anacostiaws.org

Chesapeake Waterkeepers
Robin Broder, Board of Directors
Website: http://www.waterkeeperschesapeake.org

Glen Echo Aquarium
Kim Lowther, Program Specialist
Website: http://gepaquarium.org/

DC Water
Torri Epperson, Education Outreach Coordinator
Website: https://www.dcwater.com/environmental-education

Day 1
How rivers are formed

Day 1
How rivers are formed

1

Introduction

Water likes to stick together (**surface tension)** and water (usually!) obeys gravity. That's how **rivers** form. Water collects at a **watershed** and begins to trickle down hill. As more water comes together, you get **streams**. Little streams feed into bigger streams (**tributaries**), and tributaries feed into rivers.

All rivers begin at a source. This can be a watershed or natural **spring** or **glacier.**

Water in liquid and solid form causes **erosion,** which cuts down into the soil, creating lower surfaces for water to flow.

Water Basics: If your kids need a refresher in water basics (the states of matter and the water cycle), see page XX. You'll find books, activities, and more.

Questions to guide explorations and experiments

- What is a river?
- How do rivers form?
- What is a watershed? Where is our watershed?
- Why does water flow? What is surface tension?
- What is erosion?

Books and activities

- **Books:** all about watersheds and how rivers form.
- **Activities:** explore watersheds and erosion.

Children's Books

Fiction

- *Kumak's River: A Tale from the Far North* by Michael Bania (Gr K-2)
- *Minn of the Mississippi* by Holling C. Holling (Gr 3-5)
- *Paddle to the Sea* by Holling C. Holling (Gr 3-5)
- *Rain Drop Splash* by Alvin Tresselt (Gr K-2)
- *The River: An Epic Journey to the Sea* by Patricia Hegarty (Gr K-2)
- *Where the River Begins* by Thomas Locker (Gr K-2)

Poetry

- *All the Water in the World* by George Ella Lyon and Katherine Tillotson (Gr K-3)
- *Earth Verse: Haiku from the Ground Up* by Sally Walker (Gr 2-4)
- *How to Cross a Pond: Poems About Water* by Marilyn Singer (Gr 3-5)
- *Over in a River: Flowing Out to Sea* by Marianne Berkes (Gr K-2)
- *River Story* by Meredith Hooper (Gr K-2)
- *Water Dance* by Thomas Locker (Gr K-2)
- *Water Rolls, Water Rises / El agua rueda, el agua sube* by Pat Mora (Gr 2-5, bilingual)

Nonfiction

- *The Big Rivers: The Missouri, the Mississippi, and the Ohio* by Bruce Hiscock (Gr 3-5)
- *A Drop of Water* by Walter Wick (Gr 3-5)
- *DK Eyewitness: Pond and River* by Steve Parker (Gr 3-5)
- *DK Eye Wonder: Rivers and Lakes* by DK Publishing (Gr K-2)
- *Erosion* by Joelle Riley (Gr 3-5)
- *Explore Rivers and Ponds (25 Great Projects)* by Carla Mooney (Gr K-2, Gr 3-5)
- *Follow the Water from Brook to Ocean* by Arthur Dorros (Gr K-2)
- *I Get Wet* by Vicki Cobb (Gr K-2)
- *My Water Comes From the San Juan Mountains* by Tiffany Fourment et al (Gr 3-5)
- *National Geographic Kids: Water* by Melissa Stewart (Gr 1-5)
- *River Wild: An Activity Guide to North American Rivers* by Nancy Castaldo (Gr 3-5)

Water Words

Aquifer
An underground layer of rock, sand, or gravel that stores large amounts of water. Aquifers provide water for wells and springs.

Brackish
A mix of freshwater and salt water — what you find in an estuary.

Delta
A triangle of sand and soil deposited where a large river meets the sea.

Eddy
A small current of water that spins against the main current, creating a small whirlpool.

Erosion
Wearing away of the land by wind, ice, and water.

Estuary
The wide mouth of a river, where freshwater meets the salty tidal waters of the sea.

Floodplain
A wide, flat area of land next to a stream or river that can flood.

Glacier
A large body of ice moving slowly down a slope or valley or spreading outward on a land surface.

Headwaters
Streams that form the beginning of a river.

Lake
A large area of fresh water, surrounded by land.

Marsh
A low, wet, muddy area, often thick with tall grasses.

Meander
A natural curve or bend in a river, often occurring in the middle course.

Mouth
The place where a river meets a larger body of water.

Oxbow
A U-shaped bend in a river.

Pond
A small body of quiet water, smaller than a lake.

Rapids
A part of a river or stream where the water moves very quickly, often over rocks.

River
A large natural stream of fresh water flowing in a long line across the land.

Sediment
Loose particles of rock that are carried along and deposited by a river.

Source
The place where a stream or river begins.

Spring
A place where water comes up through the ground.

Stream
A small flowing body of water, smaller than a river.

Surface tension
The "sticking together" of water molecules on the top surface. It explains why insects can walk on water!

Swamp
A low, wet area usually covered with water where trees like mangrove and cypress grow.

Tributary
A stream or river that flows into a larger stream or river.

Upper river, middle river, lower river
The 3 main parts of a river. **Upper:** the fast-moving part near the source, often with rapids and waterfalls. **Middle:** where the river gets wider and slows down, often following a winding path (meander). **Lower:** where the river reaches the end of its journey (mouth).

Waterfall or cascade
Where water falls from a higher place, like a cliff.

Watershed
The area of land drained by a river, river system, or lake.

Wetland
An area of very wet, muddy land with wild plants, such as a swamp or marsh.

1

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 our DC Metro watershed and the organizations that help keep it healthy.

Exploring your watershed

Ask kids: What does your watershed look like? Where do you live within your watershed? Encourage kids to use watershed maps to find out where the rivers near you begin, what states or areas are in your watershed, and to identify creeks, streams, rivers, ponds, lakes, and wetlands that make up your watershed.

They can also use maps of watersheds to identify components of a watershed and trace water through the watershed. **Ask kids:** Can you use the maps to explain and predict how and why water moves through the area of land?

Online resources

Researching our watershed (U.S. Geological Survey)
https://water.usgs.gov/wsc/

Anacostia River Watershed Maps (Anacostia Watershed Society)
https://www.anacostiaws.org/our-watershed/maps.html

Potomac River Watershed Map (Ferguson Foundation)
http://fergusonfoundation.org/trash-free-potomac-watershed-initiative/watershed-map/

Anacostia Watershed Jr. Ranger booklet (National Park Service)
https://www.nps.gov/nace/learn/kidsyouth/upload/jrwatershed2.pdf

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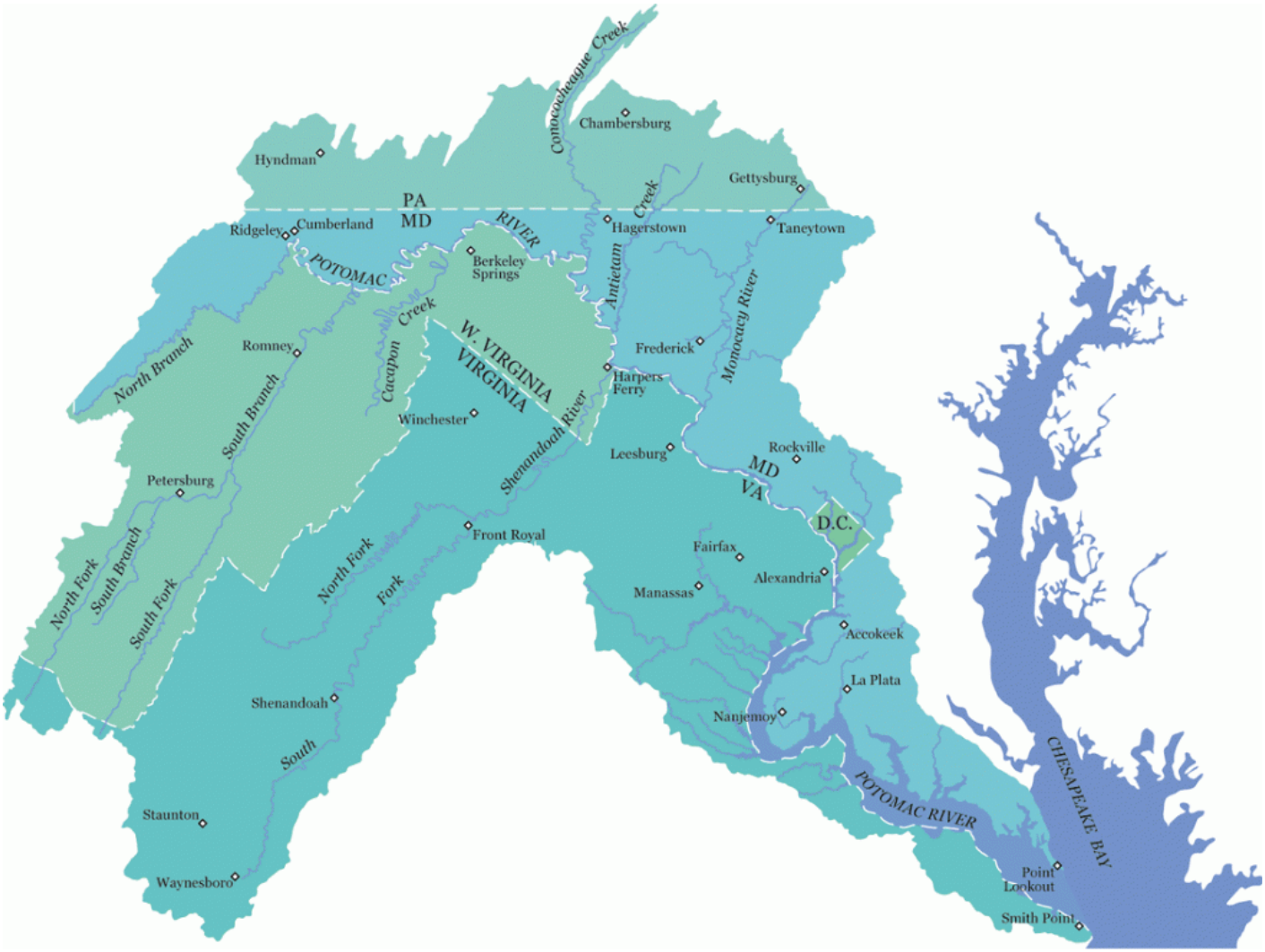
Potomac River Watershed



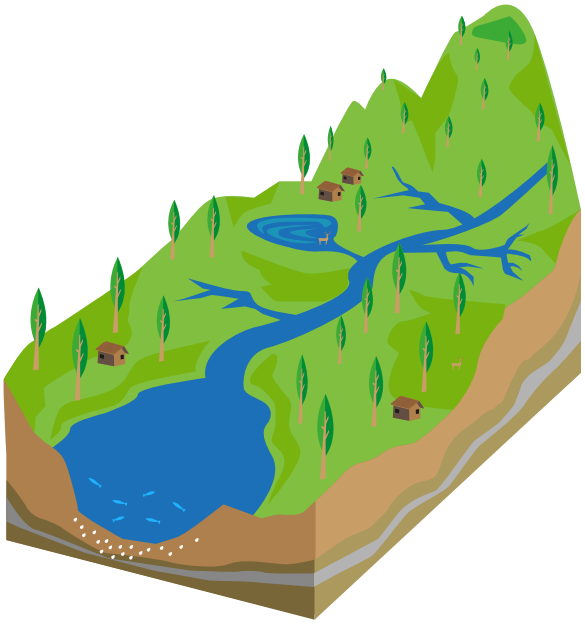
Activity 1: Watershed Model

Introduction

Rain has to go somewhere. The land that drains **precipitation** into a body of water — such as a river — is its **watershed**. How the land is shaped — its hills, mountains, and valleys — determines how the water flows. Kids can use items from the recycling bin to create a model that helps them explore how water drains in a watershed.

Supplies

- A large, shallow plastic bin or storage container and a large sheet of plastic, such as a light-colored plastic shower curtain or large white garbage bag slit open. To do this activity outside on a larger scale, you can use two plastic tarps.
- Clean objects of different sizes from the recycling bin to create watershed topography, such as plastic containers, boxes, cans, and bottles. Natural items such as rocks and sticks can be used too.
- A spray bottle filled with water
- Marker
- Pencil, paper, or journal for recording observations



Get kids thinking ...

Start by asking a couple of questions: How does water get into a river? Where does all the water in the river come from? Talk about where water goes when it rains. What does that look like? Build a model watershed together to see where water flows when it falls on land.

Watch: What Is a Watershed?
https://www.youtube.com/watch?v=QOrVotzBNto

Activity 1: Watershed Model

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Let's get started!

Think and talk about what your model will look like. Tall mountains, lots of hills and valleys? Stack and arrange the containers and other objects in your bin (or on your tarp outside). You can stack items on top of each other for high elevation!

Take a look at your model and ask kids to identify its hills, mountains, and valleys. Then ask for predictions about what will happen if it "rains." You can use a marker to draw lines on the plastic to show predictions. Spray the model with water. Where does the water go?

After you arrange your items, drape the large sheet of plastic (or the second tarp) over your objects. Push the plastic down where there are gaps between items to form mounds, peaks, ridges, and valleys.

Have paper and pencil handy to record observations and spray the model.

Ask the kids: What happens? Where did the water travel? Where did the water collect? Were predictions correct? Have kids write and draw their observations. They can even create a map and name the rivers and lakes that formed in their model.

Save the watershed model for future explorations on pollution in watersheds and rivers!

Activity 1: Watershed Model

(continued from previous page)

More watershed activities

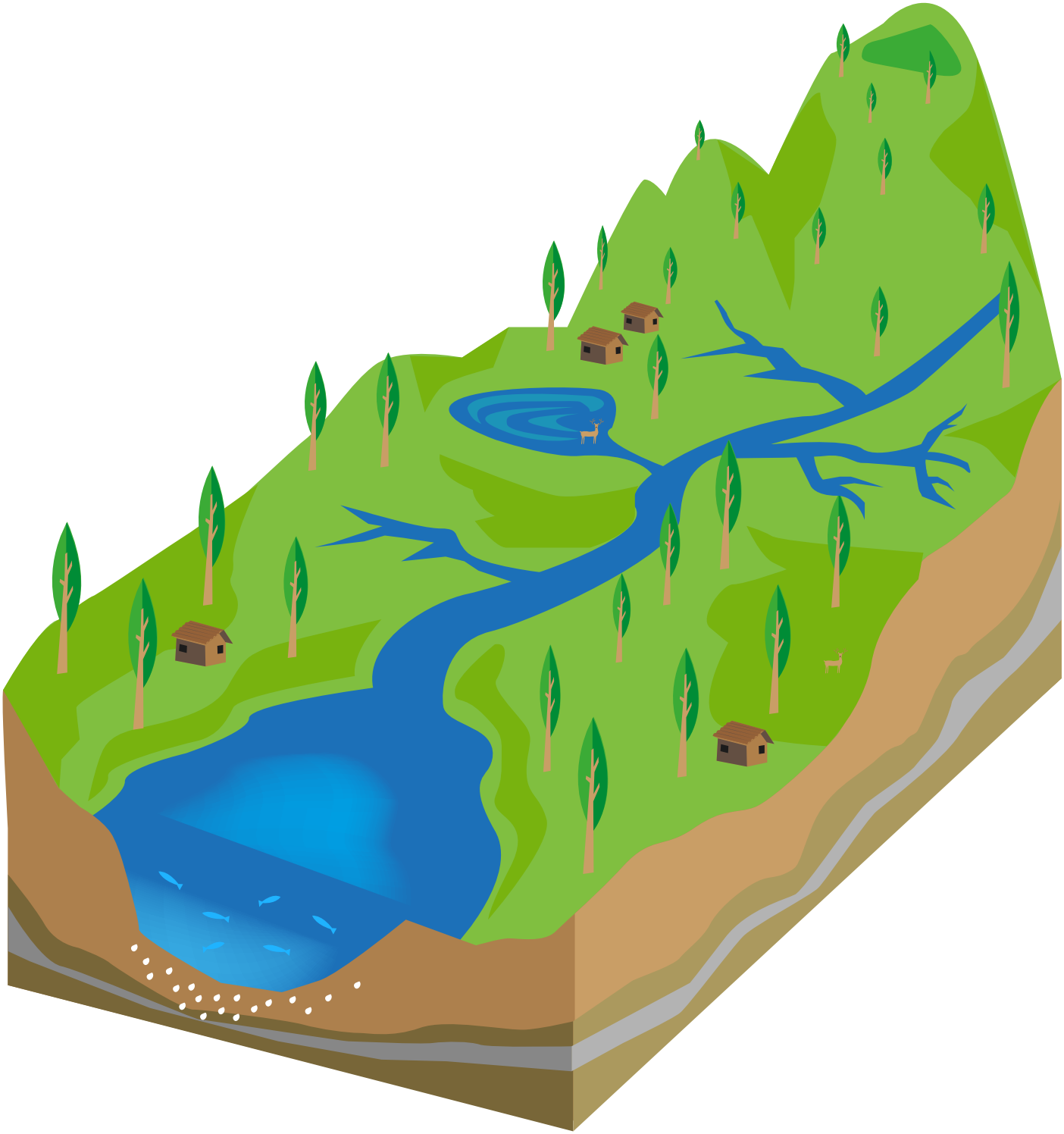
Build a Watershed and Explore Effects of Pollution (PBS Kids)
http://pbskids.org/plumlanding/educators/activities/build_a_watershed_ed.html
https://www.youtube.com/watch?v=lBMgGWM-8mQ

Crumpled Paper Watershed (Ferguson Foundation)
http://fergusonfoundation.org/teacher_resources/crumpled_paper.pdf

Shower Curtain Watershed (Monterey Bay Aquarium)
https://www.montereybayaquarium.org/-/m/pdf/education/curriculum/shower_curtain_watershed.pdf

Mapping the World's Watersheds (National Geographic)
https://www.nationalgeographic.org/activity/mapping-watersheds/

Diagram of a Watershed



Activity 2: Erosion Exploration

Introduction

Erosion is what happens when parts of landforms get moved around thanks to wind, water, ice, and gravity. Water's ability to move materials from one place to another make it a big player in the erosion process. Let kids get a close-up look at erosion with this experiment.

Supplies

- Sand
- Dirt
- Soil
- Pebbles or gravel
- Large, shallow pans or other containers
- Spray bottle
- Watering can
- Water
- Pencil, paper, or journal for recording observations

Get kids thinking ...

Let kids get their hands dirty to make observations about the sand, dirt, soil, and gravel. **Start by asking a couple of questions:** How does each material feel? What's the same? What's different? How do they think water would affect each?

Talk about erosion and the role water plays. Have kids create landforms in the shallow pans using the materials provided. Encourage them to make a landform from each of the materials and landforms that are combinations of the materials, but only one landform per pan. Provide a little water to help shape and hold landforms together.

Have everyone wash and dry their hands so they can draw pictures of how their landforms are shaped and write down predictions about how their landforms will stand up to the forces of water and gravity.

Provide water for the spray bottle and watering can. **Ask kids:** What happens when landforms are misted with water? How is the dry "land" affected? What happens once the "land" is saturated?

Activity 2: Erosion Exploration

(continued from previous page)

Now raise the end of the pan that includes the landform and place a book or other object under the pan to hold it up at an angle. Have the kids add water to the landforms, experimenting and observing what happens with the spray bottle, the watering can, and water poured from a cup.

Ask the kids: What happened to each of the landforms? How did your landforms change? Draw pictures of the eroded landform to compare them to the originals.

For a big finish — especially if doing these activities outside — flood the landforms!

More erosion activities

Mighty River in a Gutter: Sediments on the Move (Earth Learning Idea)
http://www.earthlearningidea.com/PDF/River_in_a_gutter.pdf

Hands-on Activity: Erosion in Rivers (Teach Engineering)
https://www.teachengineering.org/activities/view/nyu_erosion_activity1

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

Think about what you've learned about rivers. Imagine you are travelling from the start of a river — its source — to its mouth where it reaches the sea. The trip takes four days. Write a diary entry for each day describing what you see and hear along the course of the river. (Provide vocabulary words to support younger writers.)

Journal writing

- Write your predictions and observations from the watershed model you built.
- Observe and reflect on your exploration of your local watershed, rivers or streams.
- Explain how erosion moves things. How does water change the Earth's surface?

Play with words

- Write a poem about a river or watershed. Try a riddle poem: http://www.readwritethink.org/files/resources/lesson_images/lesson169/WriteARiddle.pdf
- Catch a poem at the river! Listen to the sounds of the river and put them on paper in your own words: https://www.ctriver.org/portfolio-items/river-sounds-dinosaur-footprints/
- Research and list all the different names/synonyms for river or stream.

Reflection questions

- Where does rainwater go?
- Where is my watershed and what does it mean to me?
- What effect do humans have on watersheds?

Kid-friendly Websites and Apps

Websites

Eyes of Paint Branch
http://www.eopb.org/

USGS Science in Your Watershed
https://water.usgs.gov/wsc/

3D Geography: Rivers
http://www.3dgeography.co.uk/river-facts

Love to Know: Wetlands for Kids
http://kids.lovetoknow.com/wiki/Wetlands_for_Kids

Earth's Kids: Ponds and Wetlands Science
http://www.earthskids.com/ek_science-pond-wetland.htm

WaterLife: Where Rivers Meet the Sea (Interactive online game from NOAA)
https://www.commonsensemedia.org/game-reviews/waterlife-where-rivers-meet-the-sea

Educational apps

DIY Lake Science
https://www.commonsense.org/education/app/diy-lake-science

iBiome: Wetland $
https://www.commonsense.org/education/app/ibiome-wetland

Model My Watershed
https://wikiwatershed.org/model/

Outings in the DC Area

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 and things to do

These outings offer opportunity to explore where rivers begin, get a good look at the different courses of local rivers, and see how rivers shape the land in different ways as they move from source to mouth:

The Anacostia Tributary Trail System
http://www.pgparks.com/Facilities/Facility/Details/Anacostia-Stream-Valley-Trail-62

Paint Branch Trail
https://www.montgomeryparks.org/parks-and-trails/paint-branch-stream-valley-park-trail/

Year of the Anacostia Events (free and $)
https://www.yearoftheanacostia.com/events

Theodore Roosevelt Island
https://www.nps.gov/this/index.htm

Kingman and Heritage Islands
http://www.kingmanisland.org/things-to-do/

Potomac Overlook Regional Park and Nature Center
https://www.novaparks.com/parks/potomac-overlook-regional-park

Great Falls
https://www.nps.gov/grfa/index.htm