# River Rangers!

A five-day 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 five-day 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.

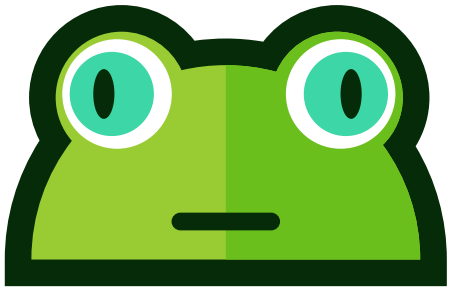
Day 1: How rivers are formed

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, and 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 pages 126-132 in the Appendix.

- **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. For example:

> "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.

# 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!

Chesapeake Waterkeepers
Robin Broder, Board of Directors

Glen Echo Aquarium
Kim Lowther, Program Specialist

DC Water
Torri Epperson, Education Outreach Coordinator

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Rachael has more than 20 years of experience developing partnerships with nonprofit organizations, corporations, and public agencies to benefit at-risk children and families. She has launched national campaigns, coordinated special events, and developed original content for the National Education Association, Reading Is Fundamental, HarperCollins Children's Books, PBS, Reach Out and Read, and WETA's Learning Media initiatives (Reading Rockets, Colorín Colorado, and AdLit.org). Rachael is currently the Director of Programs for Everybody Wins DC.

# 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 96. 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.

**Precipitation**
Water falling in the form of rain, snow, sleet, or hail.

**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**
**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.

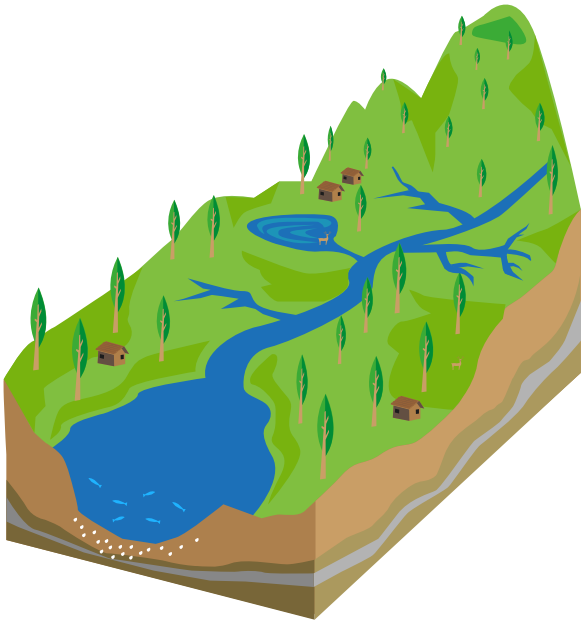
# Activity 1: Watershed Model

## 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!

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.

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?


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

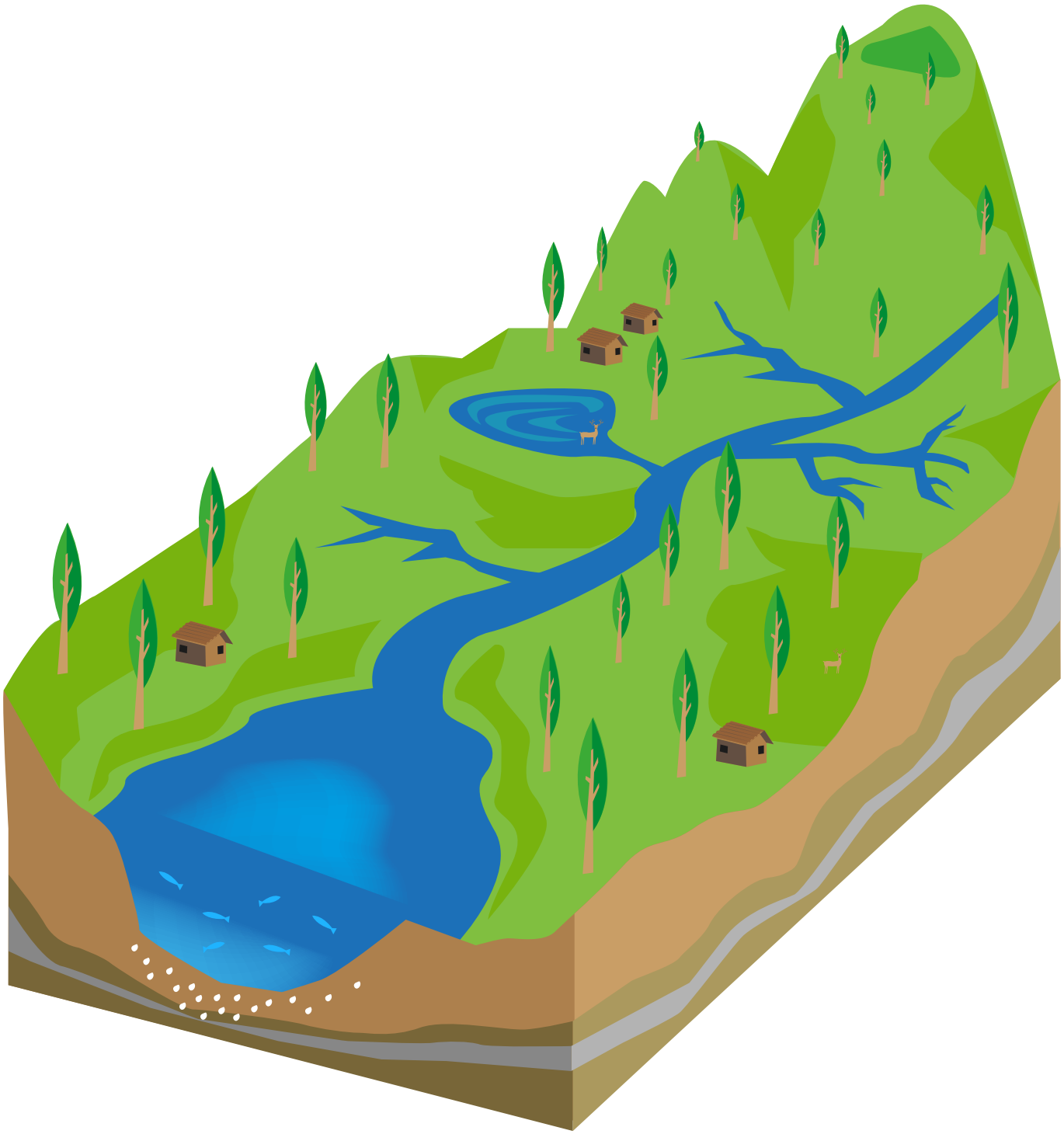
Build a Watershed and Explore Effects of Pollution (PBS Kids)
http://pbskids.org/plumlanding/educators/activities/build_a_watershed_ed.html
https://www.youtube.com/watch?v=lBMgGWM-8mQ

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
- Potting soil
- Pebbles or gravel
- Lots of large, shallow pans or other containers
- Spray bottle
- Watering can
- Cup
- 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. Look at your list of water words for inspiration.

## Writing prompt

Think about what you've learned about rivers. Imagine you are traveling 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.
- What new ideas did you learn when exploring? What surprised you? What will you share with others or explore more?
- 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 people have on watersheds and rivers?
- What effect does water have on landforms?

# 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/

# Day 2

## River habitats: who lives here?

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# River habitats: who lives here?

## Introduction

This day focuses on how rivers provide a **habitat** for plants and animals. Many animals and plants live in rivers and their surrounding areas like **wetlands** (**swamps**, **marshes, bogs**). These living things are part of a **food web** and need each other and the water to survive. **Indicator species** can help us learn about the health of a river habitat.

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## Questions to guide explorations and experiments

- What is a habitat? What kind of habitat is a river?
- What is a wetland? What kind of habitat is a wetland?
- What kind of plants do you find in a wetland?
- What do the animals eat?
- How do the animals change the river?
- How do animals use the river?
- How can you study the health of a river by looking at the animals that live there?

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## Books and activities

- **Books:** all about wetlands, habitats, and food webs.
- **Activities:** exploring wetlands, observing habitats, and creating food webs.

# Children's Books

## Fiction

- *Everglades* by Jean Craighead George (Gr K-3)
- *Have You Seen My Duckling* by Nancy Tafuri (Gr K-1)
- *Lotus and Feather* by Ji-li Jiang (Gr 2-5)
- *Make Way for Ducklings* by Robert McCloskey (Gr K-2)
- *Over and Under the Pond* by Kate Messner (Gr 1-3)
- *A River* by Marc Martin (Gr 1-5)
- *The Raft* by Jim LaMarche (Gr 2-5)
- *The Wind in the Willows* by Kenneth Grahame (Gr 1-5)

## Poetry

- *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)
- *Song of the Water Boatman* by Joyce Sidman (Gr 1-3)

## Nonfiction

- *Beavers* by Gail Gibbons (Gr 1-3)
- *DK Eyewitness: Pond and River* by Steve Parker (Gr 3-5)
- *DK Eye Wonder: Rivers and Lakes* by DK Publishing (Gr K-2)
- *Explore Rivers and Ponds (25 Great Projects)* by Carla Mooney (Gr K-2, Gr 3-5)
- *Marshes and Swamps* by Gail Gibbons (Gr 1-3)
- *Meadowlands: A Wetlands Survival Story* by Thomas R. Yezerski (Gr 3-5)
- *Otters Love to Play* by Jonathan London (Gr 1-3)
- *River Wild: An Activity Guide to North American Rivers* by Nancy Castaldo (Gr 3-5)
- *Swamp Chomp* by Lola M. Schaefer (Gr K-2)
- *Trout Are Made of Trees* by April Pulley Sayre (Gr 1-3)

# Water Words

**Biome**
A large community of plants and animals adapting to their environment. There are 5 biomes on Earth. Rivers, streams, ponds, lakes, wetlands, estuaries, and oceans are part of the Aquatic Biome.

**Bog**
Wet, spongy ground, full of decaying mosses that form peat.

**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.

**Ecosystem**
A community of living things in a shared environment.

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

**Food chain**
A series of living things that are linked to each other because each thing feeds on the one next to it in the series.

**Food web**
The interlocking food chains within a community.

**Habitat**
The natural environment of a plant or animal.

**Indicator species**
Plants or animals whose health confirms the health of the surrounding environment.

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

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

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

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

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

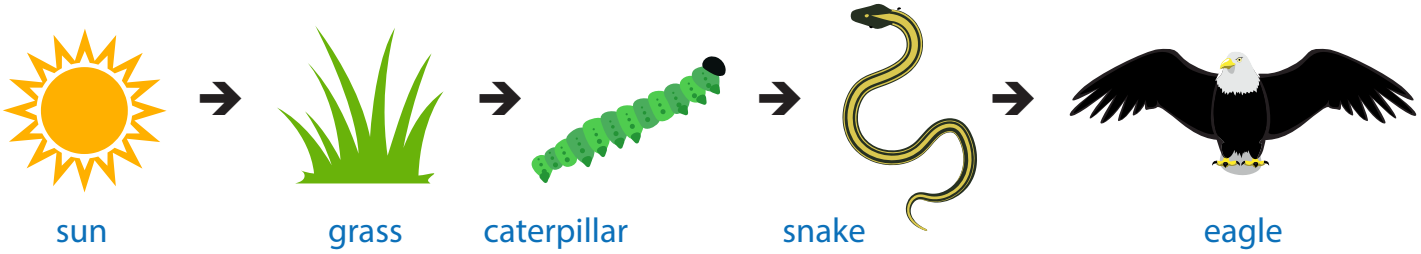
**Wetland**
An area of very wet, muddy land with wild plants, such as a swamp or marsh.

# Activity 1: Weaving a Food Web

## Introduction

All living things — plants and animals — need energy to live. Spring flowers need energy to grow and bloom. Birds need energy to move their wings for flight. People need energy for all kinds of things, from thinking to laughing to playing soccer to sleeping.

All living things get their energy from food. Green plants use energy from the sun to make their food. Animals get their energy by eating plants or other animals. The sun is at the beginning of every food chain. Here's a simple **food chain**:



sun → grass → caterpillar → snake → eagle

A **food web** is more complex than a food chain. It is made of many interconnected food chains within a community.

In this activity, kids will be creating an active food web with a ball of yarn and their bodies!

## Supplies

- Photocopy of the plant and animal cards (pages 38-43), cut along dotted lines
- Ball of yarn
- Tape or safety pins to attach cards to kids' clothing

## Get kids thinking ...

**Start by asking a couple of questions:** What happens to a houseplant if it doesn't get enough sun? Where do you get your energy? Let's say you are eating ice cream — how would you describe the food chain? Where does it start and what's in the chain before the ice cream ends up in your mouth? What happens to your "energy level" if you are out hiking or playing all day and you miss lunch?

# Activity 1: Weaving a Food Web

(continued from previous page)

## Let's get started!

Photocopy the plant and animal sheets (pages 38-43) and cut along the dotted lines. Have the kids choose one card each and tape or pin it to the front of their shirts. (Be sure that someone is the "sun.") Form a circle, with the sun standing at the center. Have every child introduce themselves as the plant or animal they represent. **Ask the kids:**

- Who in the circle would I give my energy to? (Who might eat me?)
- Who in the circle could give me energy? (Whom could I eat?)

Explain that the ball of yarn represents energy from the sun. Ask the sun to hold onto the loose end of yarn and toss (or walk) the ball of yarn to someone who can use that energy (a green plant). When the kid representing the green plant has the ball of yarn, they toss the yarn to someone next in the food chain. Keep going until the yarn reaches the animal at the top of that food chain (a carnivore — an animal that eats other animals). You've completed one food chain!

Return the yarn to the sun and start a new chain, and continue making food chains until every kid is holding at least one piece of yarn. **Ask the kids:**

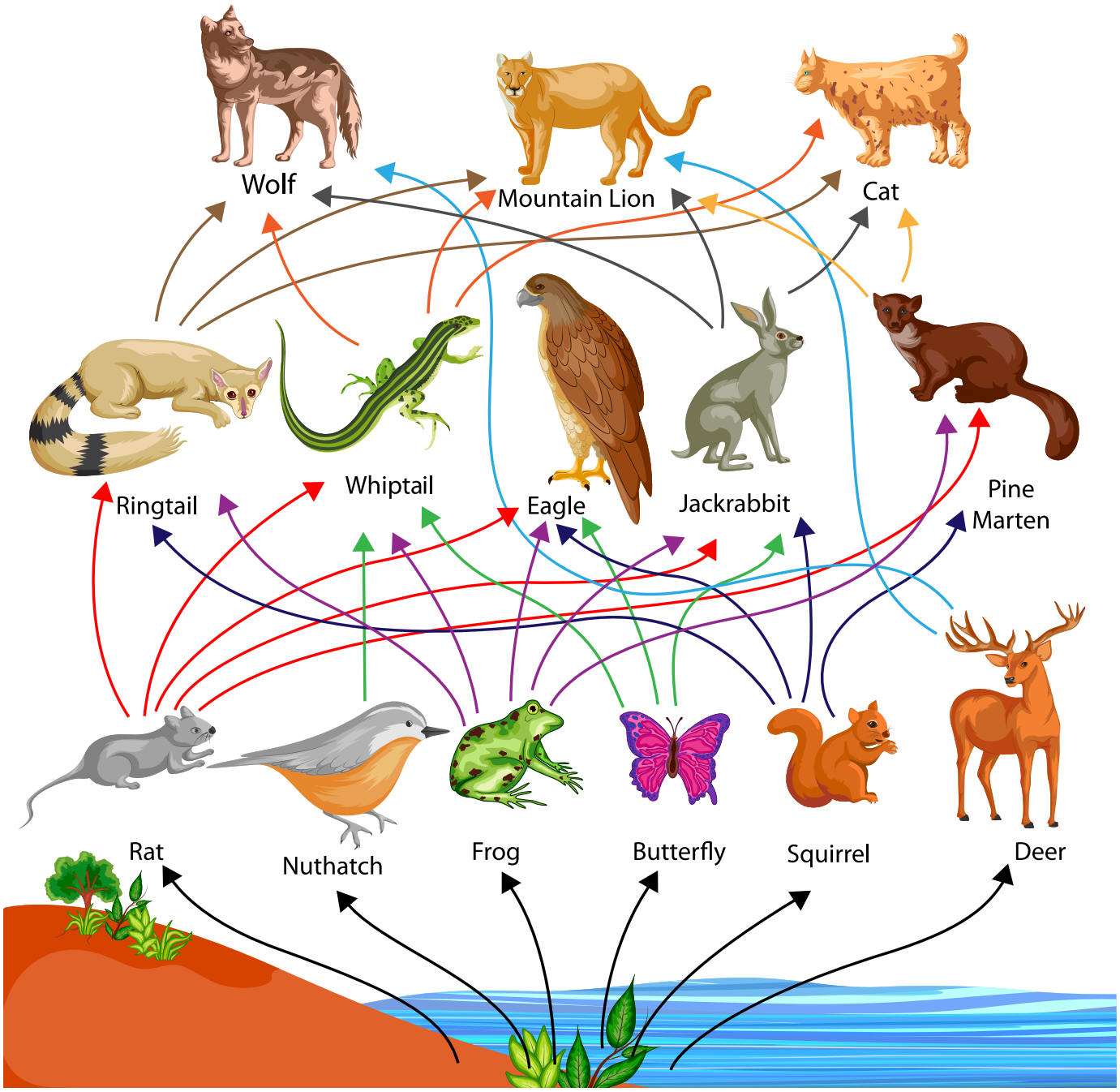
- Have we made food chains? (*Yes, many!*)
- What do all of our food chains together look like? (*A food web*)
- Who is holding the most pieces of yarn and why? (*The sun, because every food chain starts with the sun*)
- What else is part of many food chains (*Green plants*)

## More activities

Food Chain Natural Links
https://www.themailbox.com/magazines/science-idea-food-chain/natural-links

Food Chain Stacking Cups
http://rovingfiddlehead.com/kidlit/flannel-friday-food-chain-stacking-cups/

# Food Web


Wolf
Mountain Lion
Cat
Ringtail
Whiptail
Eagle
Jackrabbit
Pine Marten
Rat
Nuthatch
Frog
Butterfly
Squirrel
Deer

# Activity 2: Water Detectives

## Introduction

Are your kids ready to dive deeper into streams and rivers without getting all wet? Help them make a dipping net and an underwater viewer to get a closer look at what's living in the water.

## Supplies (for each child)

- Old pair of tights or panty hose
- Wire coat hanger
- Duct tape
- Small diameter bamboo stake or pole
- Needle and thread
- Scissors and possibly pliers
- Large, sturdy cylindrical plastic container from the recycling bin (such as a 1 lb yogurt container)
- Piece of clear plastic (for example, part of a shower curtain or a large resealable storage bag) or thick plastic wrap
- Thick rubber band
- Clean empty tub(s) or bucket(s)
- Large plastic spoons

Illustration © Monterey Bay Aquarium

## Get kids thinking ...

What animals, birds, plants, and insects might you expect to see at a river or stream? **Ask the kids:** How do they live there? How do they rely on each other to survive? How do they get food? How is a river habitat different from other habitats? What do they think life in the water is like? What does the wildlife say about the health of the river?

Help them further explore those questions with the help of a homemade dipping net and underwater viewer and a trip to a river or stream.

# Activity 2: Water Detectives
(continued from previous page)

## Let's get started!

**To make a dipping net,** take an old pair of tights or panty hose and cut off the legs mid-thigh. Have kids tightly tie the open ends of the legs together to form a net. Take a wire coat hanger and stretch the wire triangle into a square. Kids will need help to stretch the elastic waist of the tights over the square frame, fold the waistband over the wire, and sew the waistband closed around the wire with needle and thread. To form a handle for the net, completely straighten the hook of the hanger — adult hands and pliers may be helpful — and insert it into the bamboo pole. Secure it with duct tape and kids are ready to dip!

**To make an underwater viewer**, cut off the bottom of a cylindrical container. Have kids stretch a piece of clear plastic over the bottom of the cylinder. Fasten it with a rubber band and seal with duct tape.

Have kids gather their new tools for exploring, along with a tub or bucket and some large plastic spoons and head to the water! You might also want to bring a magnifying glass, towels, and some hand sanitizer.

# Activity 2: Water Detectives
(continued from previous page)

**Make sure kids stay at water's edge until everyone understands and agrees to water safety rules.** Talk with them about what they think they might find in the water and share ideas about what to look for — bugs, insect and frog larvae, worms, tadpoles, small fish.

Start by filling the tub or bucket with water from the river or stream. Let kids test their underwater viewer. Have them lower the viewer into the tub of water and look through the open end of the viewer. What do they see?

**To get dipping nets going**, let kids stand at water's edge and sweep the nets slowly through the water, avoiding stirring up the bottom too much. You can use plastic spoons to help them transfer whatever ends up in the net into the tub filled with river water so they can get an up close look and try to identify their finds using their underwater viewers.

Move upstream and downstream to sample from different sections of the stream or river. Talk with kids about how the physical characteristics of the stream or river create different habitats for different plants and animals. For example, shallow depths and a rocky bottom make a habitat with plenty of light and oxygen for plants and creatures that eat plants. Small, irregular waves or riffles on the water's surface can help you find this type of river habitat.

## Indicator species

Indicator species are especially sensitive to their environment — even small ecosystem changes can affect their health and survival. Indicator species are one of the best ways to determine the health of a river or wetland. Here are some common indicator species to look for as you explore your river:

- **Mayflies, caddisflies or stoneflies** are very sensitive to the amount of oxygen in the water. If you see lots of these insects, it means that the river is pretty healthy!
- **Freshwater mussels** don't move around and they feed by filtering nutrient-rich water, which makes them sensitive to changes in water temperature, oxygen, and acidity.
- **Frogs, toads, and salamanders** have skin that is moist and permeable, making it easy for pollutants to get into their bodies. Do you see lots of tadpoles? That's a sign that the water is relatively clean.

# Activity 2: Water Detectives
## (continued from previous page)

- **Striped bass and brook trout**: ask kids why fish are a good river indicator species.
- **Ospreys** are at the top of the food chain, which means they will be affected by environmental changes. They eat fish and they hunt very close to their nest. If something's affecting the fish population, the ospreys will show telltale signs indicating a problem. They are also very visible, making them easy to monitor!
- **River otters** "eat local" (fish, crustaceans, frogs, and insects) so if the river ecosystem is polluted, those contaminants can affect the otters' health.

You might want to try the Creek Critters app from the Audubon Naturalist Society. It allows kids to find and identify small organisms that live in freshwater streams, and to report what they find. https://anshome.org/creek-critters/

**Encourage kids to take plenty of notes about their observations. Ask the kids:** Is there a plant, animal, or insect you'd like to learn more about? Head back to hit the books and find out more!

## More activities

Make-and-take field equipment (Oregon Department of Fish & Wildlife)
http://www.dfw.state.or.us/fish/STEP/docs/SS10_FieldEquiptment.pdf

Make your own monitoring equipment (Maryland Department of Natural Resources)
http://dnr.maryland.gov/education/Documents/MakeYourOwnMonitoringEquipment.pdf

# 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.

## Journal writing

- Write observations from the river visit in a nature journal. What is the water like? Fast or slow? Muddy or clear? Does the air change as you get closer to the river bank? What plants and wildlife do you see on the river banks?
- What did you find with your dipping nets and waterscopes? Include drawings of what you saw. After your river visit, look online or in nature books to identify the plants and animals you observed.

## Poetry prompt

Write a cinquain poem about rivers. The poem can be inspired by a river visit or by books you've read about rivers and the plants and animals that live there. Warm up your writing muscles by writing down some good descriptive words.

**What is a cinquain?** A cinquain is a non-rhyming 5-line poem inspired by the natural world. Here are the rules:

Line 1: One word title, a noun that identifies your topic
Line 2: Two adjectives that describe your topic
Line 3: Three "ing" verbs that describe action
Line 4: A phrase that describes something about your topic
Line 5: A noun that is a synonym or another way to name your topic

Here's an example, about trees:

tree
white, tall
reaching, bending, fluttering
leaves and twigs in the wind
aspen

# Writing About Rivers

## Animal homes

Select an animal that fascinates you and find out about its habitat, life cycle, behavior, social life — and its home. Does it live in shallow water, a hive, nest, burrow, or tree hollow? Take the point of view of the animal and write a one-page descriptive essay using specific details and rich language to describe your home and why it's perfect for you. You can include a drawing, too!

Here are some picture books about animal homes:

- *Whose House Is This? A Look at Animal Homes: Webs, Nests, and Shells*
- *Pop-Up: Animal Homes* (National Geographic Action Book)
- *Animal Homes* (Usborne Lift-the-Flap Book)
- *Is This a House for a Hermit Crab?*

## Wetland metaphors

Many functions of wetlands can be explored through the use of metaphors. A metaphor is a figure of speech that is used to make a comparison between two things that aren't alike but do have something in common. Examples: "my brain is a computer" or "the moon is a white balloon" or "my brother is a night owl."

Using this worksheet, you can explore how wetlands are like a "sponge" or a "playground" or a "filter" and more.

Wetland Metaphors Worksheet (Southwest Florida Water Management)
https://www.swfwmd.state.fl.us/files/database/site_file_sets/2588/WetlandMetaphors.pdf

# Kid-friendly Websites and Apps

## Websites

Wild DC (Arkive)
http://www.arkive.org/c/wilddc

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

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

FrogWatch (DC.gov)
https://doee.dc.gov/service/frogwatch

Freshwater Habitats (National Geographic Kids)
https://kids.nationalgeographic.com/explore/nature/habitats/freshwater/

Build a Food Chain (online game)
http://eschooltoday.com/ecosystems/build-a-food-chain-game.html

## Educational apps

Habitactics $
https://www.commonsense.org/education/app/habitactics

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

Meet the Insects: Water and Grass Edition $
https://www.commonsensemedia.org/app-reviews/meet-the-insects-water-grass-edition

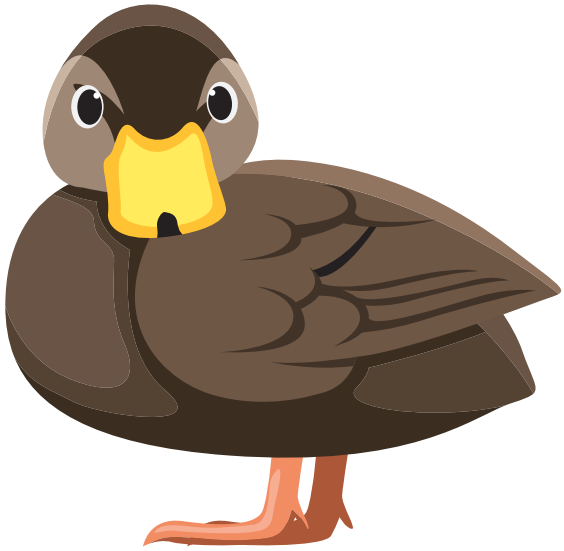
Project Noah: "citizen science" field guides
https://www.commonsense.org/education/app/project-noah

Water Life: Where Rivers Meet the Sea
https://www.commonsensemedia.org/game-reviews/waterlife-where-rivers-meet-the-sea

# Food Web Card 1

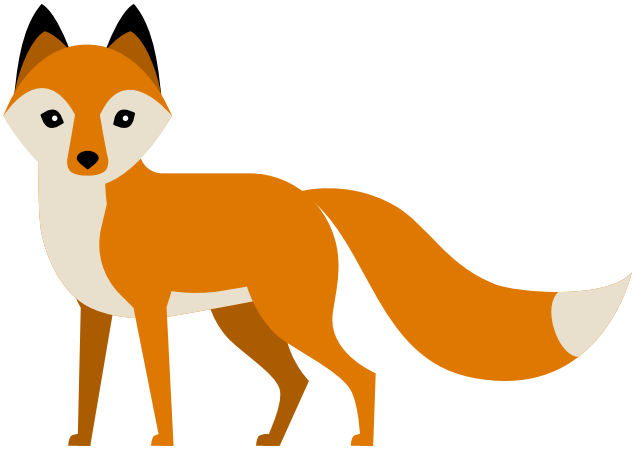
2

Human



Duck

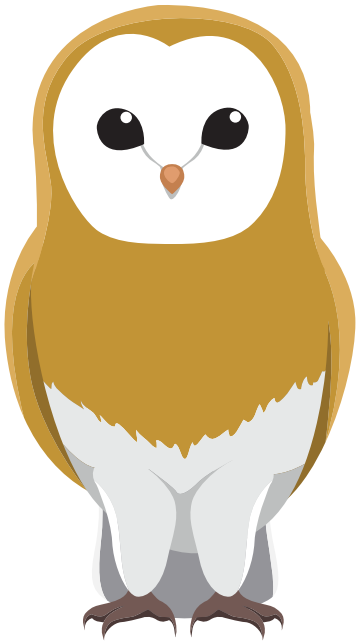
Dandelion



Fox

# Food Web Card 2

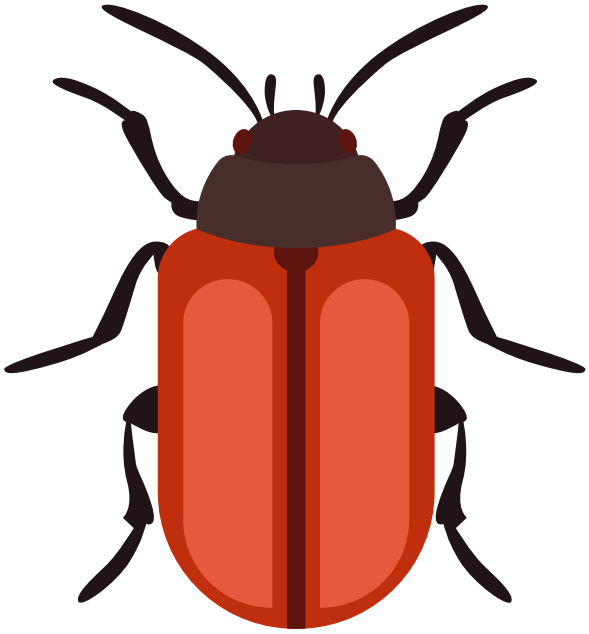
2



Owl

Bobcat

Cattail



Beetle

# Food Web Card 3

2

Mouse

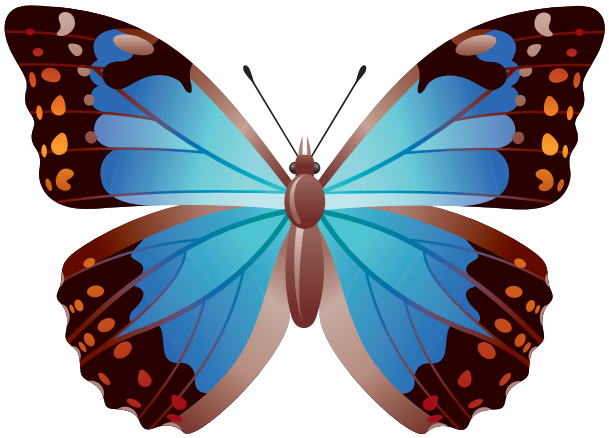
Sunflower

Robin

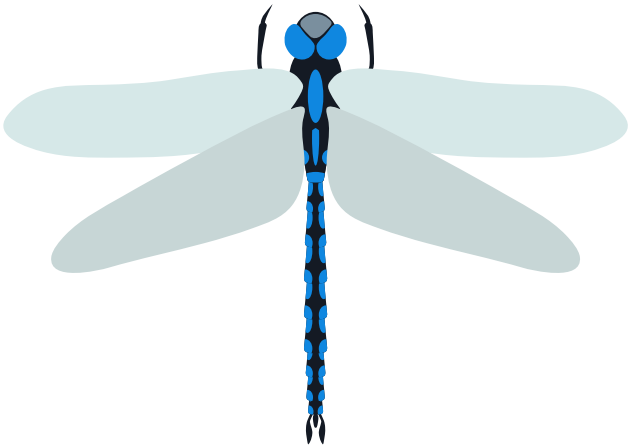
Blue Jay

# Food Web Card 4

2



Butterfly



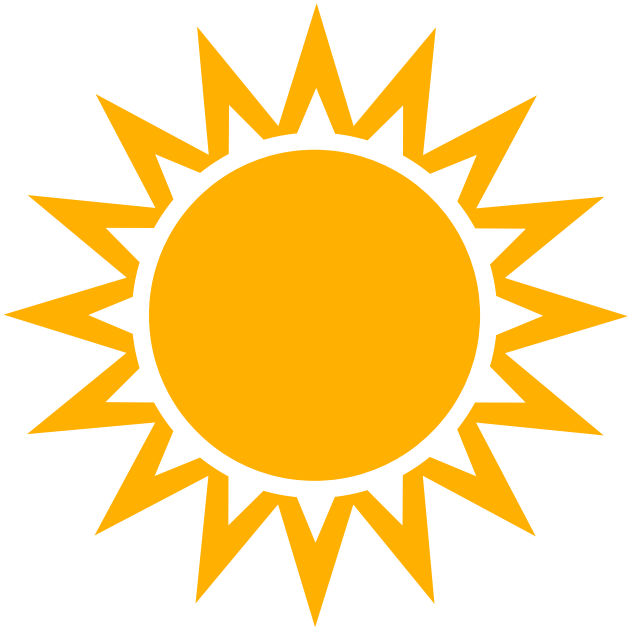
Dragonfly

Wildflowers

Coyote

# Food Web Card 5

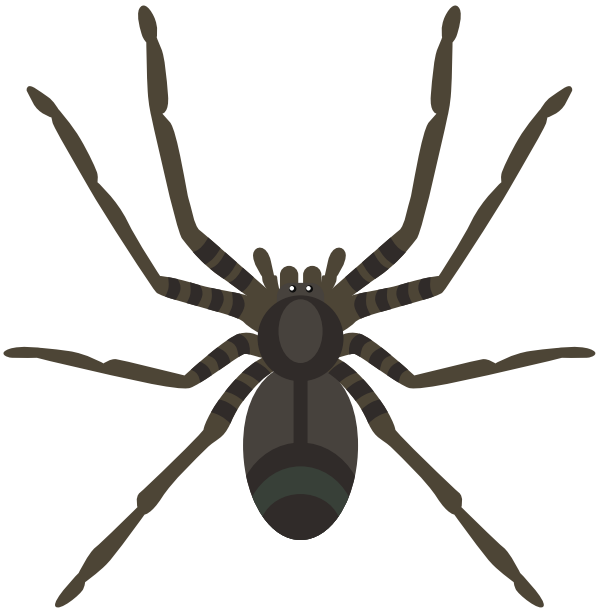
2



Sun

Grass

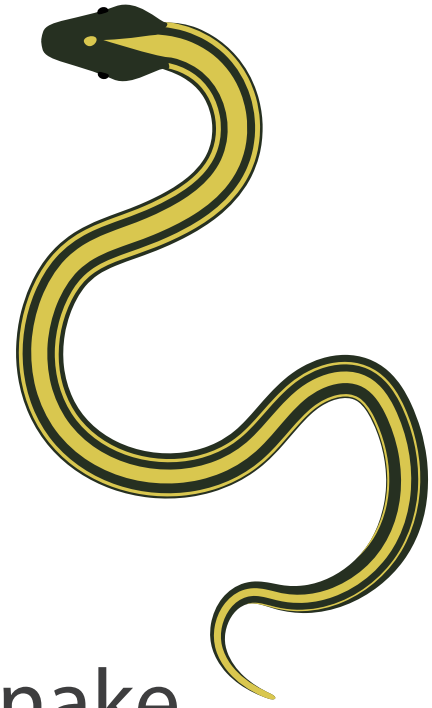
Rabbit



Spider

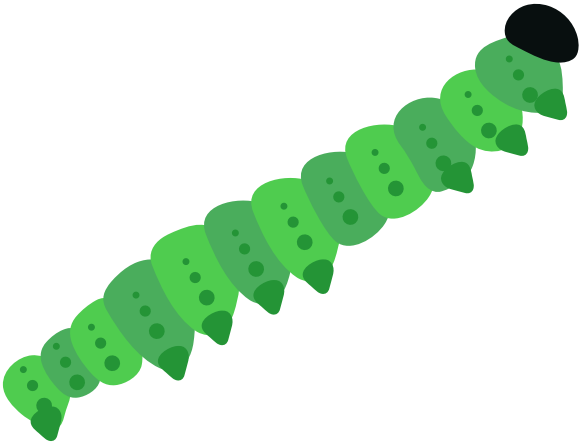
# Food Web Card 6

2



Snake

Frog



Caterpillar

Hawk

# Day 3

## People on the river

# Day 3
# People on the river

## 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

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## 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?

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## 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

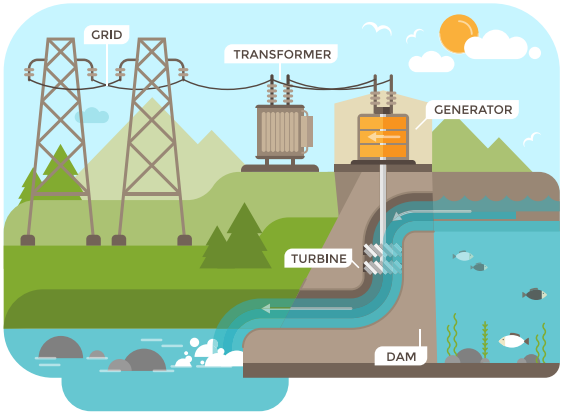
- *10 Rivers That Shaped the World* by Marilee Peters (Gr 3-5)
- *Bridges Are to Cross* by Philemon Sturges (Gr 1-5)
- *Caught in the Rapids — Can Science Save Your Life?* by Felicia Law and Gerry Bailey (Gr 2-5)
- *The Great St. Lawrence Seaway* by Gail Gibbons (Gr 2-5)
- *The Hoover Dam* by Elizabeth 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.

# 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.

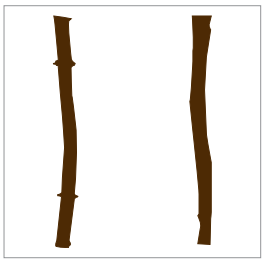
As you gather sticks, talk about the river books you've read together (*The Raft* is an especially good book for this activity). Ask kids what kind of adventures they'd like to have on the water. Think aloud together about things besides travel and recreation that we depend on rivers for, such as drinking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

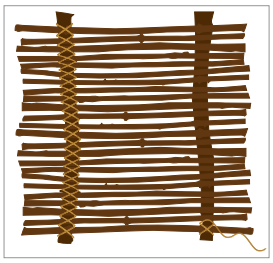
Also talk with kids about how raft size depends on the size of the sticks. Sticks that are 10 to 12 inches long may be easiest to work with. If you don't have a ruler or tape measure, estimate stick length with a known standard, such as a dollar bill (6.14 inches). Most of your sticks should have a similar 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
(continued from previous page)

## 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 additional 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

Saugus Iron Works Water Wheel
https://www.youtube.com/watch?v=EytzKIR6G70

Homemade waterwheel
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
(continued from previous page)

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.

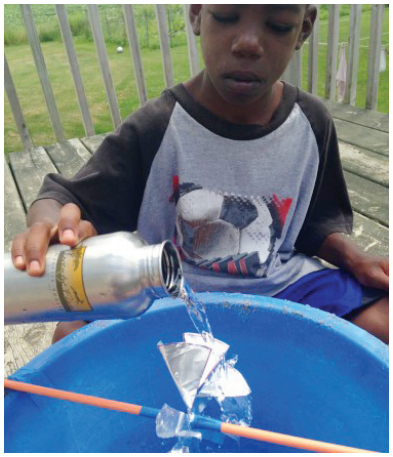


Photo © Green Kids Crafts

## 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

# 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!)

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## 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.

### 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

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.

# 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.commonsensemedia.org/app-reviews/wwf-free-rivers

Village Farm Dam Construction
https://play.google.com/store/apps/details?id=com.onetengames.village.farm.dam.construction

# Day 4
## The water in my cup

# Day 4
# The water in my cup

## Introduction

This day focuses on access to clean water:

- How cities and towns use river water as a municipal water supply
- How municipal water systems supply clean water for citizens
- How people without a municipal water supply get their water

---

## Questions to guide explorations and experiments

- How does water get to your house from the river? What is the process?
- How do I know if the water is clean?
- What happens if the water people drink isn't clean?
- In other places, how do people get water?

---

## Books and activities

- **Books:** water access, water quality, and the water treatment process.
- **Activities:** water use, access to water, and water treatment.

# Children's Books

## Fiction

- *A Country Far Away* by Nigel Gray (Gr 1-2)
- *Letting Swift River Go* by Jane Yolen (Gr 1-3)
- *Luz Makes a Splash* by Claudia Davila (Gr 3-5)
- *The Water Princess* by Susan Verde (Gr 1-3)

## Poetry

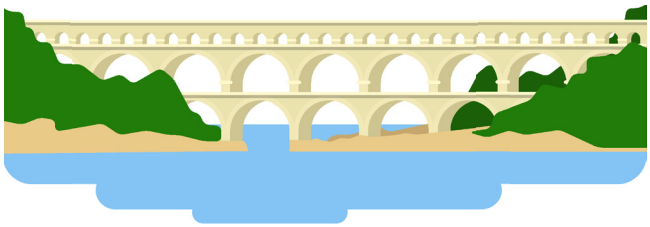
- *The Negro Speaks of Rivers* by Langston Hughes (Gr 3-5)

## Nonfiction

- *A Cool Drink of Water* by Barbara Kerley (Gr K-2)
- *The Drop in My Drink* by Meredith Hooper (Gr 1-4)
- *Every Last Drop: Bringing Clean Water Home* by Michelle Mulder (Gr 3-5)
- *I Walk for Water* by Lindsey Andrews (Gr 1-2)
- *The Magic School Bus Inside the Waterworks* by Joanna Cole (Gr K-3)
- *My Water Comes From the San Juan Mountains* by Tiffany Fourement (Gr 4-5)
- *Not a Drop of Water to Drink (National Geographic Investigates)* by Michael Burgan (Gr 4-5)
- *One Well: The Story of Water on Earth* by Rochelle Strauss (Gr 3-5)
- *Our World of Water* by Beatrice Hollyer (Gr 3-5)
- *Trout Are Made of Trees* by April Pulley Sayre (Gr 1-3)
- *Water Wow! An Infographic Exploration* by Antonia Banyard and Paula Ayre (Gr 1-5)

# Water Words

## Aqueduct
A large pipe or canal that carries a water supply to a city or a farming area. Or, a bridge with many arches for carrying water across a valley or river. The ancient Romans built enormous stone aqueducts.



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

## Ground water
The water beneath the earth's surface that supplies springs and wells.

## Municipal water supply
Water that is provided by your local city or town government.

## Reservoir
A place where water is collected and stored. Towns and cities often have reservoirs for their water supply.

## Sewers
Large underground pipes that carry off the liquid and solid waste of a town or city.

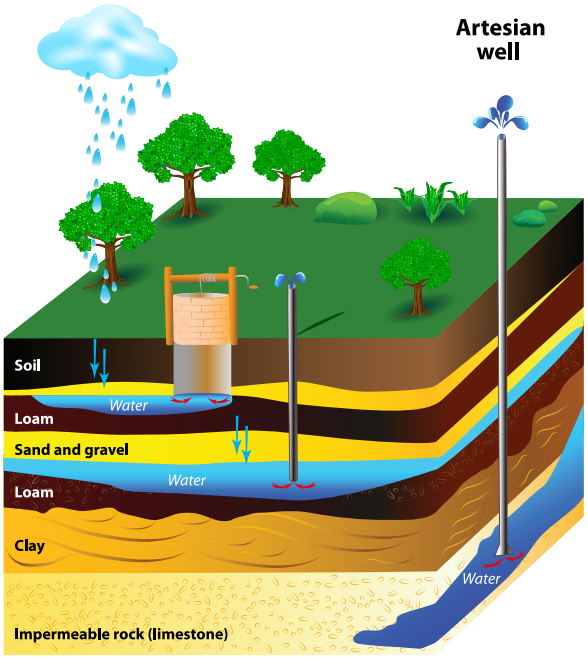
## Storm sewer
A drain designed to carry away large amounts of water during heavy rains or flooding.

## Utility
An important service such as water, electricity, or gas that is provided for everyone, and that everyone pays for.

## Waste water
Water that has been used, either in homes or in industry, and contains contaminants.

## Water treatment
Any process that improves the quality of water for drinking, industrial water supply, irrigation, recreation, or many other uses.

## Well
A deep hole dug in the ground to get water.



# Activity 1: Make a Water Filter

## Introduction

Help kids understand how water from lakes, rivers, and groundwater that ends up in their cup gets cleaned and ready to drink when they engineer a water filter.

## Supplies

- Clear 2-liter plastic bottles cut into two pieces, about a 1/3 of the way down the bottle
- Thick paper towels
- Gravel
- Sand
- Dirt
- Items to "pollute" water such as dirt, grass, twigs, bits of plastic, cooking oil, food coloring, etc.
- Water
- Containers for mixing polluted water

## Let's get started!

Talk with kids about the importance of water in our daily lives. Get them thinking and talking about how many times today they have used water. **Ask the kids:** What would you do if you turned on the faucet and no water came out? Where else could you find water? Is that water good to drink? What if you couldn't buy bottled water or get water from a faucet? What would you do?

Together brainstorm water sources in your community. Have kids identify local bodies of water and ask, Does it look clean? Would you drink that water? Use it to cook or wash or brush your teeth? Even if it looks clean, is it okay to drink it?

Talk about what kids know about filters. Ask, Have you seen a filter before? What does a filter do? Come up with examples kids may have encountered such as coffee filters or aquarium filters and talk about how a filter works. **Ask the kids:** Can you think of how a filter could help get water clean?

Put some of those ideas to the test. First, pour water into several containers and give kids materials to "pollute" it. Have them make notes about what goes into each container.

# Activity 1: Make a Water Filter

(continued from previous page)

Now that there is dirty water ready to be cleaned, it's time to make a water filter! Have kids turn the part of the 2-liter bottle with the neck upside down and fit it into the bottom half of the bottle. Let kids engineer their filter as they see fit, but have them start by putting a layer of paper towels into the bottle right above the neck. Encourage them to layer gravel, sand, dirt, etc. **Ask the kids:** What do you think will happen when the polluted water is poured through these layers?

Photo © Three Little Rascals

Have them make predictions for each of the polluted waters they've created and note their results. To avoid flooding the filter — and to get a good look at the filtered water — empty the bottom of the bottle after each test.

Kids may want to redesign their filters after testing. Remind kids that even though water that went through their filter looks "clean" it will still have invisible items, such as bacteria or other contaminants, that need to be removed. Talk about how an additional chemical process is necessary to remove those impurities.

## More water filter activities

Walter Filter Science Project (video)
https://www.youtube.com/watch?v=tPP_Yn2w2Sk

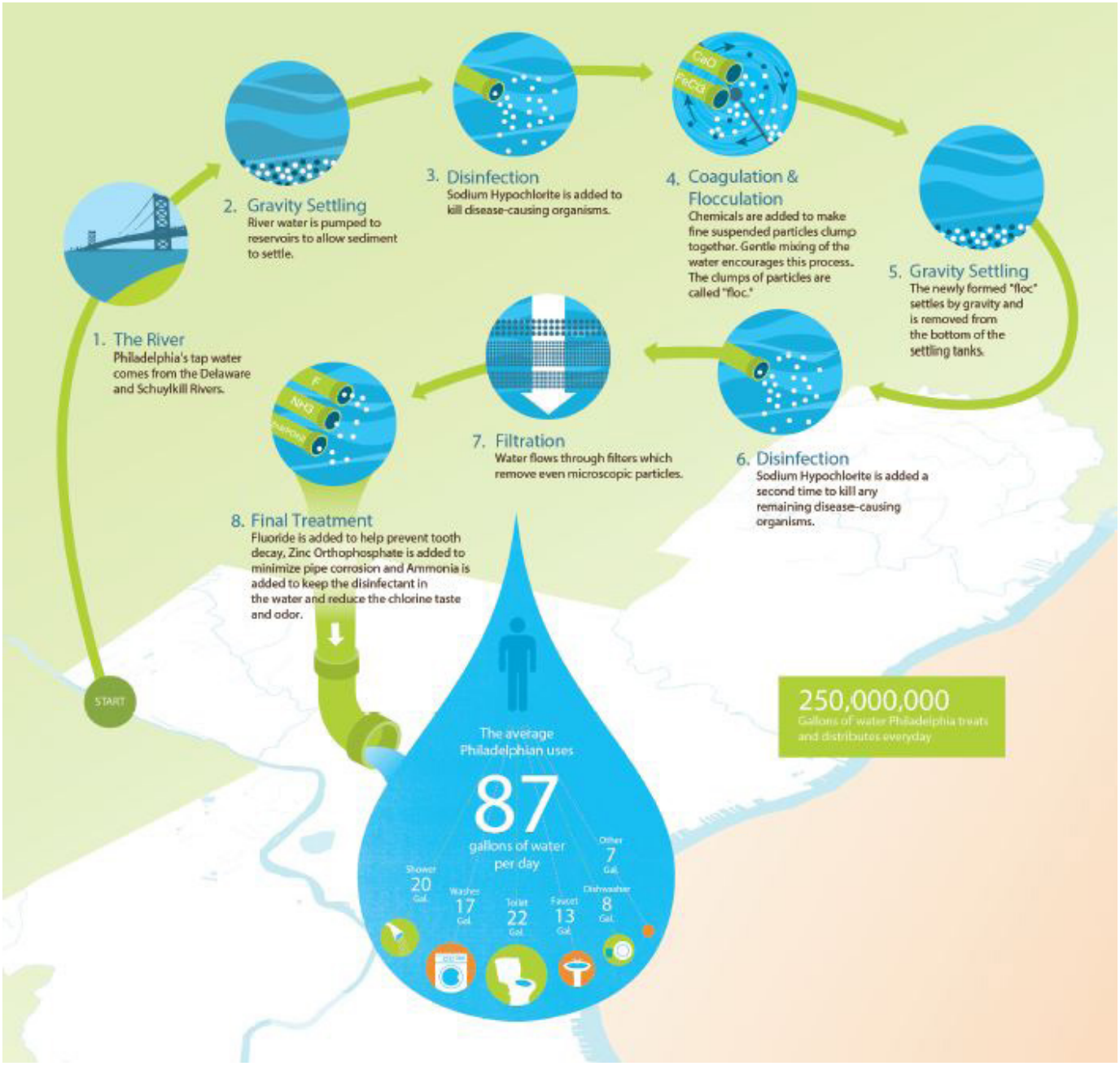
Filtration Investigation (Try Engineering)
http://tryengineering.org/lessons/filtration.pdf

Make a Walter Filtration Plant Model (U.S. Environmental Protection Agency)
https://www3.epa.gov/safewater/kids/flash/flash_filtration.html

# Steps in Water Treatment


Diagram from Willamette Water Supply, Oregon.

# Steps in Water Treatment




Philadelphia's Drinking Water Treatment Process © Fairmount Water Works

# Activity 2: Daily Water Use

## Introduction

Many people around the world can't turn on a tap and get any water at all. Folks have to go get and transport their water. 600 million people spend up to 6 hours each day doing just that. The need for transporting fresh water prevents many children, especially girls, from going to school. In this activity, kids will look at their own water use and explore what it would be like to provide water for their family.

## Supplies

- Printout of Daily Water Use chart for each child
- Two jugs or buckets filled with 1 gallon of water, or two 8-lb weights

## Let's get started!

Ask kids to calculate how much water they use in a day, in gallons. Give each child a printout of the Daily Water Use chart (see next page). There are several different ways to figure out usage:

- Ask kids to fill out their Daily Water Use chart at home based on one day of observations.
- Estimate usage with this free H2O Tracker app: https://itunes.apple.com/us/app/h2o-tracker/id566633837?mt=8&ls=1
- Use this online tool from DC Water to record usage: https://www.dcwater.com/kids/activities/dailywaterusage.html)

When every child has their daily water usage estimate, it's time for some simple math! Ask the kids to multiply the number of gallons they use per day by 8 lbs (the weight of a gallon of water) to determine how heavy it would be if they had to carry that water in a container instead of just turning on a tap.

**Number of gallons you use each day X 8 lbs = your daily water load to carry**

Have each kid lift the two buckets or jugs, each with a gallon of water, or the two 8-pound weights, to feel how heavy it is. **Ask the kids:** What would it be like if you had to carry this much water every day on foot, walking for a mile or more?

# Water Usage Charts

## Daily water usage in the U.S.

The average American family uses more than 300 gallons of water per day. About 70% of that is water we use in our homes. Use this chart to record how many gallons of water you use each day.

**My name:** _____

**Toilet:** 3 gallons (each flush) _____

**Bath:** 36 gallons (average) _____

**Shower:** 2 gallons per minute _____

**Washing hands and face:** 1 gallon _____

**Teeth brushing:** 1 gallon (average) _____

**Glasses of water** (128 ounces in a gallon) _____

**Washing Machine:** 23 gallons (average) _____

**Dishwasher:** 2 gallons (average) _____

**Leaks:** 17 gallons (average) _____

## What are some ways I can save water at home?

_____

_____

_____

# Water Usage Charts

## Food's big water footprint

What you eat makes up at least two-thirds of your total water footprint. That's because of the large amount of water needed to grow and produce your food.

| Food Item | Serving Size | Water Footprint |
|---|---|---|
| Hamburger | 1 (includes bread, meat, lettuce, tomato) | 660 gallons |
| Eggs | 1 egg | 52 gallons |
| Soda | 17 ounces | 46 gallons |
| Salad | 1 (includes tomato, lettuce, cucumbers) | 21 gallons |

## The hidden water in everyday things

Did you know that it takes almost 660 gallons of water to make a t-shirt? Of course, we don't "see" that water — it's hidden in the way we grow cotton, and manufacture and deliver the shirt. **Ask the kids**: What is all that water used for? This chart shows how much water is used to make other common products. The average American's daily water footprint for all the (non-food) household goods we buy, use, and throw away is about **600 gallons.** "Reduce, reuse, recycle" can help save a lot of water!

| Item | Water Footprint |
|---|---|
| Car | 13,737 – 21,926 gallons |
| Leather Shoes | 3,626 gallons |
| Smart phone | 3,190 gallons |
| Jeans (cotton) | 2,108 gallons |
| T-shirt (cotton) | 659 gallons |

All information from The Water Footprint Calculator: https://www.watercalculator.org/water-use/

# Activity 2: Daily Water Use

(continued from previous page)

## Imagine a day without water

Now imagine that the **well** or **spring** you usually walk to for water is empty. **Ask the kids:** What could be the reason that there is no clean water? (drought, monsoon rains). What would a day be like without water? Have kids fill in the printout on the next page.

## When the water in your tap is unhealthy

Sometimes we think that access to clean water is a problem that happens "over there" — not in our own country. But there are communities in the U.S. where people lack safe drinking water. The drinking water crisis in Flint, Michigan is a recent story. The town's water was contaminated with lead as a result of improper water treatment and old pipes. You can learn more about what happened in Flint in these stories:

The Water Crisis in Flint, Michigan (DOGO News)
https://www.dogonews.com/2016/1/20/the-water-crisis-in-flint-michigan

Flint Water Crisis: Rap Video (Flocabulary)
https://www.flocabulary.com/unit/week-in-rap-extra-flint-water-crisis/

Flint's Water Crisis Explained in 3 GIFs (Time Magazine)
http://time.com/4191864/flint-water-crisis-lead-contaminated-michigan/

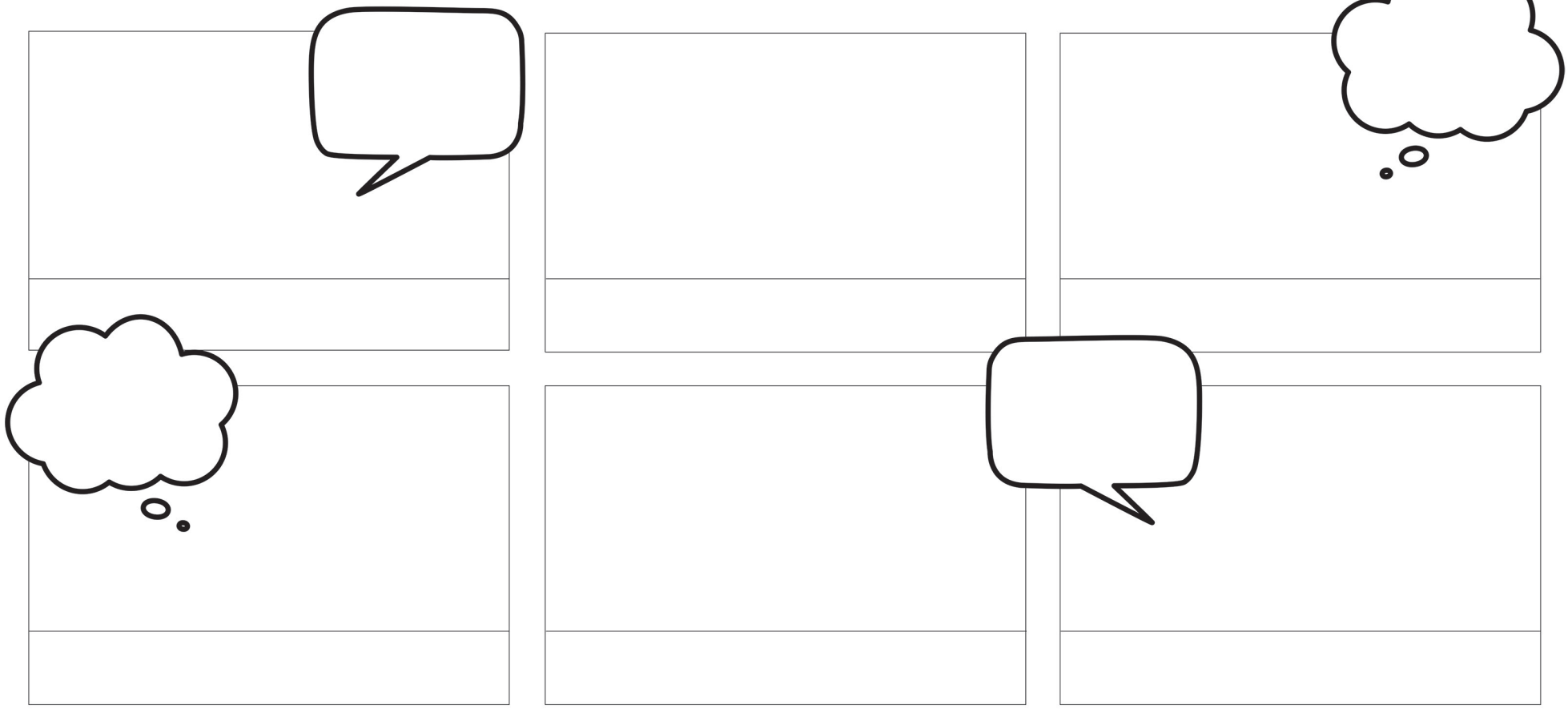
## Reflection questions

- What surprised you about how much water you use? How would your life be different if you didn't have easy access to clean water?
- Cities and towns clean the water for their residents. Some people get water from wells on their property instead. What are the advantages and disadvantages of both sources of water? Which would you rather have?

dc water is life®

**Instructions**
Imagine that you woke up one day, went to brush your teeth and turned on the faucet to discover that there was no more water left in the WORLD! What would happen? Add speech or thoughts into the shapes, draw in the top and add narrative in the area at the bottom of each cell.

# Imagine a Day Without Water



# 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

Read *The Magic School Bus: Inside the Waterworks*. Now imagine that you are a drop of water moving through a water treatment plant, from collection to clean up to storage and distribution. Write a series of "Wish you were here!" postcards to your friends about what it's like each step along the way.

## Journal writing

For one week, write down all the ways you use water at home. Reflect on things you can do to reduce your use of water.

## Posters and PSAs

Water is a precious resource. A lot of effort goes into getting clean water to people, so it's important not to waste it. We use water in many ways — some are obvious like cooking or taking a shower. Some ways are hidden —like the amount of water needed to make a new cell phone.

Learn about some things you can do to save water (see the list on the next page).

Choose one or more actions and create a poster that explains what every kid can do and why it's important. Include photos or drawings, and think about a headline that will grab people's attention. If you have access to an audio or video recorder, you can also make a Public Service Announcement (PSA) to share with family, friends, and neighbors.

4

# 10 Simple Ways to Save Water

**1. Build a rain barrel** to catch rainwater so that storm drains don't get overloaded. Use the stored water for your garden.

**2. Add native plants to your garden.** They require less water and fertilizer and are more resistant to pests and disease since they are already adapted to local conditions. If you need to fertilize, use organic options such as garlic.

**3. Reduce. Reuse. Recycle.** Every item we use takes water to make it and transport it. Instead of butying new things, shop at a thrift store. Recycle or donate items you don't need anymore.

**4. Park that car.** Transportation uses water, too! Walk, ride a bike, take the bus, carpool, or use car share to get where you're going.

**5. Be water wise!** Use low-flow faucets, showers, and toilets and repair any leaks.

**6. Be water wise!** Take shorter showers, and turn off the tap when brushing your teeth or washing dishes.

**7. Be water wise!** Run dishwashers and clothes washers only when full

**8. Be water wise!** Wash your car and water your lawn only when necessary.

**9. Grow your own vegetables.** Water is used to transport and store fresh produce at the grocery store.

**10. Drink smart.** Drink water, not soda. Did you know that it takes 45 gallons of water to make 16 ounces of soda?

# Kid-friendly websites and apps

## Websites

Safe Drinking Water Is Essential (Koshland Science Museum)
https://www.koshland-science-museum.org/water/new/en/index.html

Blue Plains Advanced Wastewater Treatment Facility (DC Water)
https://www.youtube.com/watch?v=Nb16X8gb9ME

Our Fragile Environment: Water Supply (Brain POP)
https://www.brainpop.com/science/ourfragileenvironment/watersupply/

DC Water for Kids
https://www.dcwater.com/kids/

Daily Water Usage (DC Water)
https://www.dcwater.com/kids/activities/dailywaterusage.html

Water Footprint Calculator
https://www.watercalculator.org/water-use/

Imagine a Day Without Water
http://imagineadaywithoutwater.org/

## Educational apps

Captain Plop's Water-Saving Mission
https://play.google.com/store/apps/details?id=sawater.captainplopwatersavingmission&hl=en

H2O Tracker
https://itunes.apple.com/us/app/h2o-tracker/id566633837?mt=8&ls=1

Virtual Water $
https://itunes.apple.com/us/app/virtual-water/id369876250?mt=8

Where's My Water? $
https://www.commonsensemedia.org/app-reviews/wheres-my-water

Water1der
http://www.groundwater.org/get-informed/opportunities/water1der.html

# Day 5
## Protecting our water

# Day 5
# Protecting our water

## Introduction

This day explores the many ways that our local government and our citizens are working to protect and clean up our rivers and river ecosystems, and make sure our water sources are healthy.

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## Questions to guide explorations and experiments

- What do storm drains have to do with the water we drink?
- Why is too much stormwater a problem?
- How can people reduce stormwater runoff in their own homes and communities?
- How does oil or chemicals get into our rivers and waterways? Why is it harmful?
- How can we clean up our rivers?

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## Books and activities

- **Books:** pollution, conservation, and cleaning up our waterways.
- **Activities:** pollution, conservation, and cleaning up our waterways.

# Children's Books

## Fiction

- *Bartholomew and the Oobleck* by Dr. Seuss (Gr 1-3)
- *Cloudy With a Chance of Meatballs* by Judi Barrett (Gr 1-3)
- *Flotsam* by David Wiesner (Gr 1-3)
- *Flush* by Carl Hiaasen (Gr 4-5)
- *Grandfather's Dream* by Holly Keller (Gr 4-5)
- *Luz Makes a Splash* by Claudia Davila (Gr 3-5)
- *Pickles to Pittsburgh* by Judi Barrett (Gr 1-3)
- *Prince William* by Gloria Rand (Gr 1-3)
- *River* by Debby Atwell (Gr 1-5)

## Poetry

- *Earth Verse: Haiku from the Ground Up* by Sally Walker (Gr 2-4)
- *River of Words: Young Poets and Artists on the Nature of Things* edited by Pamela Michael (Gr 1-5)
- *Thank You, Earth: A Love Letter to Our Planet* by April Pulley Sayre (Gr K-3)

## Nonfiction

- *The Exxon Valdez Oil Spill (Scholastic)* by Peter Benoit (Gr 2-4)
- *Make a Splash! A Kid's Guide to Protecting Our Oceans, Lakes, Rivers, and Wetlands* by Cathryn Berger Kaye and Philippe Cousteau (Gr 3-5)
- *Meadowlands: A Wetlands Survival Story* by Thomas R. Yezerski (Gr 2-5)
- *Oil Spill* by Melvin Berger (Gr 1-3)
- *One Well: The Story of Water on Earth* by Rochelle Strauss (Gr 3-5)
- *A River Ran Wild: An Environmental History* by Lynne Cherry (Gr 1-4)
- *Simple Steps Toward a Healthier Earth* by Molly Smith (Gr 1-5)
- *Water Wow! An Infographic Exploration* by Antonia Banyard and Paula Ayre (Gr 1-5)
- *Why Should I Save Water?* by Jen Green (Gr K-3)
- *You Wouldn't Want to Live Without Clean Water!* by Roger Canavan and David Antram (Gr 3-5)

# Water Words

**Acid rain**
Rain, hail, or snow that is polluted as a result of certain chemicals and waste being released into the air. Acid rain is harmful to the environment.

**Conservation**
The protection of natural resources, including soil, water, or forests, from loss, pollution, or waste.

**Contamination**
To make dirty, polluted, or unusable by adding something harmful to another substance or system. Example: some rivers have high contamination levels from chemical spills.

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

**Impervious surfaces**
Surfaces that don't allow water to be absorbed, including many rooftops, driveways, and parking lots.

**Indicator species**
Plants or animals whose health confirms the health of the surrounding environment.

**Pervious (or permeable) surfaces**
Surfaces that allow water to be absorbed, such as grass, groundcover, green roofs, and paver stones.

**Pollution**
Damage to the environment caused by chemicals or dirty waste products.

**Rain garden**
A sunken garden bed that collects and treats storm-water runoff from impervious surfaces, including roof-tops, driveways, sidewalks, parking lots, and streets.

**Runoff**
Extra rainwater that is not absorbed by the ground.

**Wastewater**
Water that has been used, either in homes or in industry, and contains contaminants.

# Activity 1: Design a rain garden

## Introduction

New construction in many towns and cities is increasing the amount of **impervious surfaces** — surfaces that don't allow water to be absorbed. Too many rooftops, driveways, and parking lots result in an increase of storm water **runoff** and a greater chance for pollution to enter our waterways through storm sewer systems. Kids can learn more about how to help stop runoff when they design a **rain garden** to help direct water through the soil.

## Supplies

- Books and guides to plants native to your region or materials from your local Cooperative Extension Service
- Database for native plants in your area: https://www.epa.gov/watersense/what-plant
- Pencil and journal
- Tape measure

**[Optional] If you build a rain garden:**

- Soil mix: 50% sand, 30% compost, 20% topsoil
- Seeds, seedlings, or starter plants. Remember to choose native plants if possible, and plants that attract pollinators like butterflies and bees

## Get kids thinking ...

Get kids thinking back to what they've learned about the water cycle and your local watershed. Rain has to go somewhere. **Ask the kids:** Where does it go when it can't soak into the soil? Have kids head outside and take notes about all the pervious and impervious surfaces they see. Have kids draw a picture (aerial view if possible) of the current space. Talk about where they see water collect or travel when it rains. Have them identify natural drainage patterns and talk about how rainwater could be filtered into the surrounding soil. **Ask the kids:** Why is it important for rain to be directed to the soil rather than the storm drain?

Pervious or impervious?



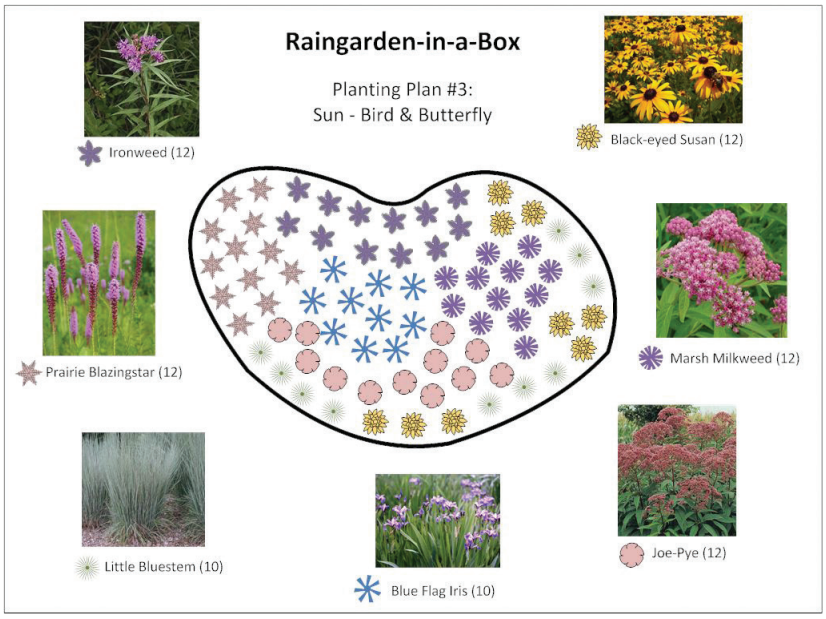

# Activity 1: Design a rain garden

(continued from previous page)

## Let's get started!

As kids see drainage patterns and how drainage could be improved, have them start mapping out their rain garden. Gardeners make and use maps to plan what, where, and when to plant. Together, you'll need to think, talk about, and investigate:

- If this is a real or imaginary garden (if you can't plant, it is still fun to imagine and plan)
- How much water your rain garden will drain
- What kind of soil you have (sandy, clay, loamy, or mixed)
- How much space you need for your rain garden (sandy soil, a rain garden should be 20-30% of the drainage area; or clay soil, a rain garden should be about 60% of the drainage area)
- What's already in or near the space (the house, patio, deck, paths, driveway, existing plants and lawn)
- Natural depressions in the landscape (a rain garden can be up to six inches deep)
- Native plants (plants that typically have deep root systems with water holding capacity)
- Where plants would find sun or shade



# Activity 1: Design a rain garden

(continued from previous page)

Encourage kids to take good notes as they research plants for their garden, keeping in mind what they've learned about soil types and availability of sun. Have kids develop garden plan details using their aerial view sketch.

To determine the size of the area that will drain into the rain garden, measure the amount of impervious surfaces surrounding the location of your rain garden. Use this formula:

length (ft) x width (ft) = _____ square feet (drainage area)

If you are able to plant your rain garden, be sure you have accurate information about underground utilities before you start digging. Consider planting seeds or using seedlings grown in trays. It may take longer to fill in the space in the garden, but it will help keep costs down. And kids love to plant seeds!

As the garden grows, kids can continue to add details to their map such as birds, insects, and animals that have visited or plant growth charts. The links below offer detailed guides to building a rain garden.

## More rain garden activities

What Is a Rain Garden (WGCU Curious Kids, video)
http://www.wgcucuriouskids.org/what-is-a-rain-garden/

Rain Garden Designs (Prior Lake – Spring Lake Watershed District, MN)
https://www.plslwd.org/2013/05/raingarden-in-a-box-designs/

Rain Gardens (Oregon State University Extension Service)
http://extension.oregonstate.edu/stormwater/sites/default/files/Rain%20Gardens.pdf

Build a Rain Garden (12,000 Rain Gardens)
http://www.12000raingardens.org/build-a-rain-garden/

Rain Garden in a Box (Port of Vancouver)
https://www.portvanusa.com/assets/Grattix-how-to-flyer.pdf

# What Is a Rain Garden?

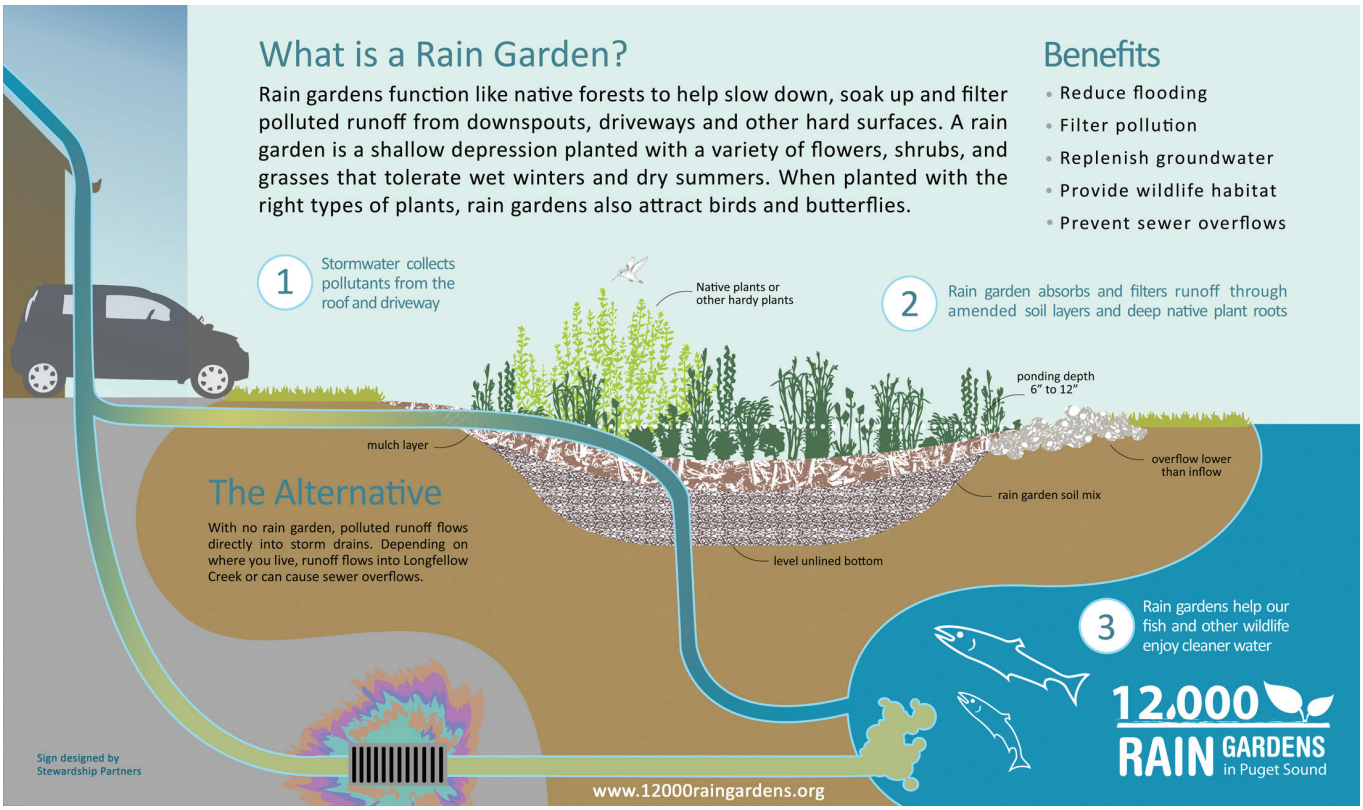



Diagram © 12,000 Rain Gardens

# Activity 2: Storm Drain Cleanup

## Introduction

Storm drains carry excess water from rain away from our streets — and into our local waterways. But what happens if the water we send down our storm drains isn't clean? In this activity, kids will explore how the water from storm drains can impact the water quality of local waterways.

## Supplies

**"Waterway"**

- Aquarium tank or large clear plastic recycled container (like those big pretzel containers from Walmart or Costco)
- Rectangular cardboard box (to fit over aquarium or plastic container)
- Water
- Watering can or spray bottle

**"Pollutants"**

- Green food coloring (pesticides and fertilizer)
- Vegetable oil (motor oil)
- Soil, sand, pebbles (erosion)
- Grass clippings or shredded paper and twigs
- Cafeteria waste or trash

## Get kids thinking ...

When rain falls or water runs off from sprinklers where do you think the water goes? Some of the water flows downhill to the nearest creek or ditch — that's called stormwater runoff. In cities and towns, the water can't soak through the pavement, rooftops, and concrete (because they are **impervious surfaces)**.

Have you ever seen holes or openings at the curb? These are storm drains and they're connected to a pipe that carries the water directly to your local river, bay, or other water source.

# Activity 2: Storm Drain Cleanup

(continued from previous page)

## Let's get started!

**Set up the activity:** Place the aquarium on a table and fill it half-way with water. Cut a hole in the bottom of the box and place the box on top of the aquarium. The box represents the storm drain and the aquarium represents the waterway that the storm water mixes into after entering the storm drain.

Talk with the kids about the purpose of storm drains and where the water and objects that float down into a storm drain go. If you have time for a short walk outside, you might look for the closest storm drain. **Ask the kids:** What are all the things you can think of that might enter a storm drain during a rain storm?

Talk about each of the "pollutants" and ask the kids how each might get into the storm drain. Have the kids take turns adding a pollutant into the storm drain. Use the watering can or spray bottle to create rain to wash the pollutant into the waterway.

After adding all of the pollutants, examine the contents of the waterway. **Ask the kids:** How has the waterway has changed? How do these changes make you feel?

### Reflection questions

- What types of the pollution are natural?
- What types of pollution are added by people living in the local communities?
- What could be done to stop pollutants from entering storm drains?

# Activity 2: Storm Drain Cleanup

(continued from previous page)

## More stormwater activities

Stormwater Sleuth: How Much Water Runs Off? (University of Nebraska Extension)
https://water.unl.edu/documents/How%20Much%20Water%20Runs%20Off%20opt.pdf

Stormwater Sleuth: Stormwater Walk (University of Nebraska Extension)
https://water.unl.edu/documents/Stormwater%20Walk%20opt.pdf

Build Your Own Rain Barrel
https://water.unl.edu/documents/Build%20Your%20Own%20Rain%20Barrel%20opt.pdf

Storm Drain Stenciling Toolkit (Think Blue Maine)
https://cfpub.epa.gov/npstbx/files/stencil_toolkit%20FINAL.pdf

## Learn more about stormwater

Only Rain Down the Drain (interactive)
http://www.onlyraindownthedrain.com/interactive-model/

H2O Jo Takes a Ride Through the Storm Drain (City of Boulder WASH Project)
https://www.youtube.com/watch?v=ytq7DP9ENhU

Freddy the Fish Teaches About Stormwater (North Central Texas Regional Stormwater Program)
https://www.youtube.com/watch?v=jjPfLhJbdc0

Stormwater Pollution and Green Infrastructure Solutions (New York State Department of Environmental Conservation)
https://www.youtube.com/watch?v=ATNy-vaIPXI

# Activity 3: Oil Spill Challenge

## Introduction

An oil spill can happen on the ocean when a ship carrying big containers of petroleum oil starts to leak, or if an oil drilling rig malfunctions, as with the 2010 Deepwater Horizon accident off the coast of Louisiana.

Oil spills can also affect our rivers and other freshwater. If an oil pipeline that travels over land springs a leak, the oil can find its way into the local waterways and groundwater. Oil can also get into our rivers and waterways through stormwater.

Spilled oil sticks to the fur and feathers of birds and animals that live on or near the water, and is hard to remove. That's why animals are so affected by oil spills!

In this activity, kids will build a simple model of a river habitat (complete with "birds" and "mammals") and then create an oil spill. Then they will test different tools to clean up the river.

## Supplies

### Basics

- Aluminum roasting pan or plastic tub
- Water
- Vegetable oil
- Paper towels (for kids' hands)

### Habitat materials

- Large rocks to create an island
- Sticks and moss or pieces of lettuce
- Fake fur or craft pompoms and feathers
- Blue food coloring (optional)

### Cleanup materials

- Cotton balls
- Sponges, cut into small pieces
- Plastic spoons
- 12-inch pieces of string
- Dish soap (Dawn® works well)

# Activity 3: Oil Spill Challenge

(continued from previous page)

## Get kids thinking ...

Get everyone thinking about what happens when oil mixes with water. **Ask the kids:** How easy do you think it is to separate the oil from the water?

What happens to the fish, birds, and other animals that come in contact with the oil?

## Let's get started!

**First, kids create their habitats:**

- Place the rocks in the pan or tub
- Add 2-3 inches of water, to mostly cover the rocks (bigger ones can be poking out). Add blue food coloring if you have it.
- Add the sticks and lettuce or moss (the "plants") and the feathers and fake fur (the "birds" and "animals") to the water.

Photo © Secondgradealicious.blogspot.ca

**Next, create the oil spill!** Pour 2-3 tablespoons of oil into the water and observe what happens.

How does the oil react with the water, the plants, and the animals. What happens when you blow on the oil in the water? Record your observations on the chart on the next page.

Now try each of the cleanup materials and see which ones work the best. **Ask the kids:** What are the best materials for cleaning the birds and animals? What effect did detergent have on the oil? What is the string best for? (The string can keep the oil in a smaller space but can't clean it up.)

# Oil Spill Worksheet

## How did the "habitats" interact with the oil?

| Material | Reaction with oil |
|---|---|
| Water | |
| Rock | |
| Feather | |
| Stick | |
| Fur or pompom | |
| Moss or lettuce | |

## Which tools worked best for cleanup?

| **Cleaning tool** | **Pros** | **Cons** | **What habitat material does it clean the best?** |
|---|---|---|---|
| Cotton ball | | | |
| Sponge | | | |
| Spoon | | | |
| String | | | |
| Dish soap | | | |

# Activity 3: Oil Spill Challenge

(continued from previous page)

## More oil spill activities

Make an Oil Slick (San Diego Zoo)
http://kids.sandiegozoo.org/activities/slick-art

Simulating an Oil Spill Lesson Plan Video (Teaching Channel)
https://www.teachingchannel.org/videos/natural-resources-lesson-plan

Oil Spill Facts: Lesson for Kids (interactive)
https://study.com/academy/lesson/oil-spill-facts-lesson-for-kids.html

Oil Spill Activity Video (STEM etc.)
https://www.youtube.com/watch?v=RhXwJtm4Jg0

## How do scientists clean up oil spills?

Cleanup teams respond to spills using one or more of these methods:

**Containment:** Floating barriers (called booms) as well as natural and synthetic absorbing materials help prevent the spreading of oil during spills.

**Chemicals:** Some chemicals make the oil more solid and keep oil from reaching shorelines and other sensitive habitats. Other chemicals break up the oil into smaller particles which mix with water more easily.

**Physical methods:** Boats skim the sea surface, removing oil from the water. On land, wiping with absorbent materials, pressure washing, and raking and bulldozing help absorb oil.

Cleaning up oil spills with magnets and nanotechnology (CNN)
https://www.cnn.com/2012/09/21/tech/oil-spill-magnets/

Deepwater Horizon Gulf Oil Spill Recovery Special Report (Scholastic Kids)
http://www.scholastic.com/browse/collection.jsp?id=761

58,000 gallon Oil Spill in San Francisco Bay (DOGO News)
https://www.dogonews.com/2007/11/12/58-000-gallon-oil-spill-in-san-francisco-bay

# 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.

## Journal writing

Take a walk around your neighborhood and look for all the features that help or prevent rain water from soaking into the ground. Make a map of your neighborhood and add the features you see to your map. Use your new water words — **pervious surfaces** and **impervious surfaces** — to categorize the features you see. Make a list of the things that your family could do to reduce rainwater runoff (Build a rain barrel? Plant a rain garden?)

## Posters and PSAs

We all live in a watershed. Water constantly travels over the land's surfaces that include farmland, lawns and city streets, on its course to a waterway. When it rains, water runs over the surface picking up any pollutants that are on the way. Small amounts of motor oil, pet waste, pesticides or litter are multiplied along the journey to the nearest waterway.

These watersheds are a source of drinking water for homes and businesses. Learn about some things you can do to help keep the water clean in your watershed (see "10 Simple Steps to Reduce Runoff and Keep Your Water Clean" on page 93).

Choose one or more actions and create a poster that explains what every kid can do and why it's important. Include photos or drawings, and think about a headline that will grab people's attention. If you have access to an audio or video recorder, you can also make a Public Service Announcement (PSA) to share with family, friends, and neighbors.

# Writing about Rivers

(continued from previous page)

## Community drain stenciling project

Anything that goes into your storm drain goes directly into a local stream or river, which eventually empties into a bay or ocean. Cleaner storm drains mean cleaner bays and oceans for all.  Build awareness with a local drain stenciling project. Organize your neighbors to help stencil the words "Don't Dump" on storm drains in your area.

First, you'll need to get permission from the local county or city department that maintains the storm drains, by writing an informational letter detailing the who, what, when, and where of the project. Next, design and distribute a flyer to your neighbors to get them involved in the community project. Strong persuasive writing is key to getting your neighbors excited and ready to join in! Finally, it's time to gather the materials and start stenciling.

This model from the Chesapeake Bay Foundation gives you step-by-step instructions — from securing permission to gathering the materials to how to do the stenciling itself: http://www.cbf.org/join-us/education-program/resources/storm-drain-stenciling.html

# 10 Simple Steps to Reduce Runoff and Keep Your Water Clean

**1. Plant a rain garden.** Rain gardens use native plants and grasses to capture and absorb rainwater from rooftops and roads. They can reduce runoff pollution by 99%.

**2. Add native plants to your garden.** They require less water and fertilizer and are more resistant to pests and disease since they are already adapted to local conditions. If you need to fertilize, use organic options such as garlic.

**3. Compost it.** Recycle yard waste in a compost pile and use a mulching mower (borrow one from a neighbor if you don't have one).

**4. Scoop the poop.** Keep pet waste out of streets and storm drains. It contains bacteria that can find its way into waterways through runoff.

**5. Suds alert.** Wash your car at a car wash instead of doing it at home, unless you use non-toxic biodegradable soap on your car.

**6. Use eco-friendly cleaning supplies.** Some soaps and shampoos aren't removed from the water when treated. Algae will grow where it's not supposed to and ruin the water quality.

**7. Nix the Rx.** Don't throw old medicines down the drain. Most communities have safe disposal programs through their police departments, local drug stores, or other organizations.

**8. Be careful with hazardous waste.** Find out about your local recycling centers for toxic household items like paint, motor oil, and batteries — and bring your items there rather than dumping or putting in the trash.

**9. Be water wise!** Don’t water your driveway when you water your lawn! The water that lands on a driveway or sidewalk washes pollutants into storm drains.

**10. Volunteer.** Get involved in community activities to clean up waterways and monitor water quality.

# Kid-friendly websites and apps

## Websites

Water Quality Backyard Activity Guide (National Environmental Education Foundation)
https://www.neefusa.org/resource/water-quality-backyard-activity-guide

Waterkeepers
https://waterkeeper.org/

Maryland Association for Environmental and Outdoor Education: Clean Water Project Resources
https://maeoe.org/resource-library/clean-water-project-resources

How's My Waterway? (EPA)
https://watersgeo.epa.gov/mywaterway/

Our Fragile Environment: Water Supply (Brain POP)
https://www.brainpop.com/science/ourfragileenvironment/watersupply/

Storm Drain Stenciling Project (Chesapeake Bay Foundation)
http://www.cbf.org/join-us/education-program/resources/storm-drain-stenciling.html

1200 Rain Gardens (Washington State University)
http://www.12000raingardens.org/

## Educational apps

Ansel and Clair's Little Green Island $
https://www.commonsensemedia.org/app-reviews/ansel-and-clair-little-green-island

Creek Critters (Audubon Naturalist Society)
https://anshome.org/creek-critters/

Rain Garden
http://nemo.uconn.edu/tools/app/raingarden.htm

SimCity EDU: Pollution Challenge! $
https://www.commonsense.org/education/game/simcityedu-pollution-challenge

WaterLife: Where Rivers Meet the Sea
https://www.commonsensemedia.org/game-reviews/waterlife-where-rivers-meet-the-sea

# Appendices

Water basics

Facts about water and rivers

Books about water and rivers

Water words

Printable templates

Reading Rockets tip sheets

# Water Basics

## Basic facts about water

- There is a finite amount of water on the earth and it moves around through the water cycle.
- Water exists on earth in three states: solid as ice, gas as vapor, fog, or mist, and liquid as water.
- The way water behaves changes with the seasons (rain, snow, hail, flooding, drought).
- People, plants, and animals need water to live.

## Water Words

**Absorption**
The process of being soaked up.

**Clouds**
A mass of water vapor that floats in the sky. Different cloud types form at different altitudes and temperatures. 3 common cloud types: Cirrus: thin, wispy and feathery cloud. Cumulus: fluffy white cloud with a flat bottom. Stratus: wide, thick low-lying gray cloud.

**Condensation**
When gas cools and changes to a liquid, for example, when warm steam touches a cold window.

**Drought**
A long period with little of no rain.

**Evaporation**
When a liquid heats up and changes to gas.

**Flood**
An overflow of water onto land that is normally dry.

**Fog**
A thick mass, like a cloud, made up of tiny water drops floating in the air near the ground.

**Hail**
Frozen rain, or small balls of ice that fall from the sky.

**Ice**
Water in a frozen, solid state.

**Precipitation**
Water falling in the form of rain, snow, or hail.

**Rain**
Drops of water that form in the clouds and fall from the sky.

**Snow**
Soft, white flakes of ice that fall from the sky. Snow is formed when water in the upper air freezes into crystals.

**Sublimation**
When ice changes to gas, skipping the liquid state.

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

**Transpiration**
When plants give off moisture into the air.

**Vapor**
Tiny drops of water in the air; the gas form of water. Clouds are made of water vapor.

**Water**
A clear thin liquid that has no color or taste when it is pure. It falls from clouds as rain and enters rivers, lakes, and oceans. All animals and people need water in order to live.

**Water cycle**
The continuous, natural circulation of the earth's water through evaporation, condensation, precipitation, and collection in lakes, streams, rivers, and oceans.

# The water cycle

The water cycle is the continuous, natural circulation of the earth's water through **evaporation**, **condensation**, **precipitation**, and collection in lakes, streams, rivers, and oceans.

# Children's Books

## Fiction

- *Bringing the Rain to Kapiti Plain* by Verna Aardema (Gr 2-3)
- *Come on Rain!* by Karen Hesse (Gr K-2)
- *Hurricane* by David Wiesner (Gr 1-3)
- *Hurricane!* by Jonathan London (Gr 1-3)
- *It Looked Like Spilt Milk* by Charles G. Shaw (Gr 1-5)
- *Rain* by Manya Stojic (Gr 1-2)
- *Rain Rain Rivers* by Uri Shulevitz (Gr K-2)
- *The Snowy Day* by Ezra Jack Keats (Gr 1-2)
- *Waiting Out the Storm* by Joann Early Macken (Gr 1-2)
- *Walter Was Worried* by Laura Vaccaro Seeger (Gr 1-5)
- *Water Boy* by David McPhail (Gr 1-3)

## Poetry

- *All the Water in the World* by George Ella Lyon and Katherine Tillotson (Gr K-3)
- *I Know the River Loves Me / Yo se que el rio me ama* by Maya Christina Gonzalez (Gr 1-3)
- *Water Dance* by Thomas Locker (Gr K-2)
- *Watersong* by Tim McCanna (Gr K-1)
- *Weather Poems for All Seasons* by Lee Bennet Hopkins (Gr K-2)

## Nonfiction

- *Clouds* by Anne Rockwell (Gr K-3)
- *DK Eyewitness: Water* by John Woodward (Gr 3-5)
- *A Drop of Water* by Walter Wick (Gr 3-5)
- *Hurricanes* by Gail Gibbons (Gr 1-3)
- *I Get Wet* by Vicki Cobb (Gr K-2)
- *The Magic School Bus Inside A Hurricane* by Joanna Cole (Gr 1-3)
- *National Geographic Kids: Water* by Melissa Stewart (Gr 1-5)
- *One Well: The Story of Water on Earth* by Rochelle Strauss (Gr 3-5)
- *Rivers of Sunlight* by Molly Bang and Penny Chisholm (Gr 2-5)
- *Water Is Water: A Book About the Water Cycle* by Miranda Paul (Gr 1-5)

# Activities: Water, Ice, and Steam

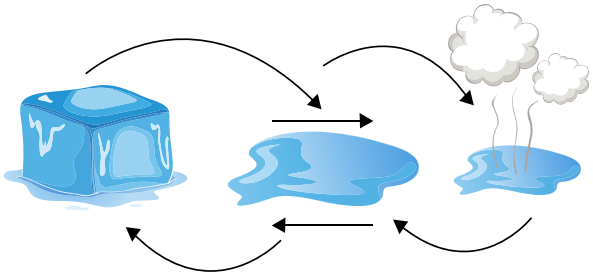
## Introduction

Introduce kids to the three states that water can be in: liquid, solid (**ice**), and gas (steam or **vapor**).

## Supplies

- Electric skillet with lid
- Ice cubes
- Water
- Large metal spoons
- Clear cup or glass
- Shaving cream
- Blue food coloring

## Get kids thinking ...



**Start by asking a couple of questions:**

- What does **ice** or **snow** feel like?
- What does water feel like?
- What does steam or **vapor** feels like?
- What makes water change its state, from liquid to solid to gas?
- What happens to ice when you take it out of the freezer?

## Let's get started!

Show the kids the ice cubes. Let them touch the ice. Ask them to describe how the ice feels and what it looks like. Put the ice in electric skillet. If you have time, let the ice melt on its own. If not, turn on the skillet to low and let the ice melt.

Once the ice has melted, ask the kids what they have observed. How has the ice changed? What state is the ice in now? (liquid) What shape is it? Ask the kids to predict what would happen if you put the water in the freezer. What would happen if you turned up the heat?

Turn up the heat on the skillet and bring the water to a simmer, so that the kids can see the water turning into steam. Be careful to kids away from the hot skillet and steam.

# Activities: Water, Ice, and Steam

(continued from previous page)

Ask the kids what they have observed about the water. How has it changed? What state is it in now? What shape is it?

Ask the kids to predict what would happen if you turned off the heat. Ask the kids to predict what would happen if the steam met with very cold air.

If you have a lid, put it on the skillet and let the steam collect and condense on the inside. After a few minutes, lift up the lid and show the kids what the steam is doing.

Ask them what they think is happening. What do they observe? How has the steam changed? What state is the steam in now? (liquid) What shape is it? What are the drops of water doing?

## Introduce water words

Talk about these words and what they mean: **evaporation**, **condensation**, **precipitation**, and for extra fun: **sublimation** (ice to gas state, skipping the water stage) and **transpiration** (water vapor produced by plants through photosynthesis).

## A spoonful of cloud

Have kids breathe on the back of a big metal spoon. What happens? They should see a tiny cloud of water vapor on the spoon! Explain that this is how real clouds form — when warm, moist air and cool air come together.

## Shaving cream clouds

- Fill a clear plastic cup with water and top with shaving cream (this is your cloud)
- Add a few drops of blue food coloring to the top of the shaving cream
- Watch as the blue dye (this is the rain) sinks through the cloud to fall as rain in the water

Ask the kids what happened — why did the food coloring drops (the rain) fall through the shaving cream (cloud)? Explain that when water vapor cools, it collects in clouds, and eventually gets heavy enough that it falls. Water collects because it's molecules like to be close together (**surface tension)**, and that's why it makes drops, pools and larger bodies of water.

# Activities: Water, Ice, and Steam

(continued from previous page)

## Make a human thunderstorm

Say: "As a group, right in this room, we are going to create a rainstorm. We will make the rainstorm using our hands and feet. Watch my hands, then follow and do the same thing."
This group exercise can be a great warm up before each day of River Rangers activities!

- Rub hands together (wind)
- Snap fingers (sprinkling rain)
- Clap hands (heavier rain)
- Slap thighs (pouring rain)
- Stomp feet and continue slapping thighs (thunder and heavy rain)
- Slap thighs (thunder stopped)
- Clap hands (rain is slowing)
- Snap fingers (rain is down to a sprinkle)
- Rub hands (sun is coming out and a fresh breeze is blowing)
- Hands on lap (silence after a storm)

Watch the human thunderstorm in action
https://www.youtube.com/watch?v=VOU5gAFV9v8

# Activities: Water, Ice and Steam

(continued from previous page)

## More water cycle activities

Water Cycle in a Bowl (PBS)
http://www.pbs.org/parents/adventures-in-learning/2015/07/water-cycle-activity/

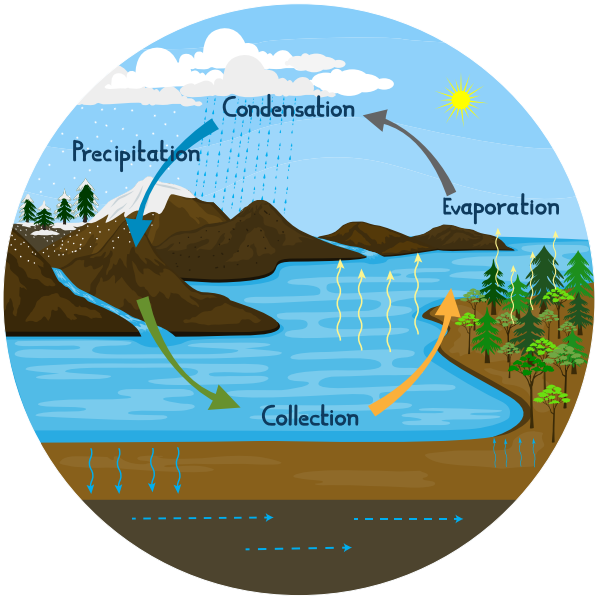
Water Cycle in a Plastic Bag (1001 Gardens)
https://www.1001gardens.org/2015/08/diy-tutorial-fog-water-rain-create-your-own-water-cycle-in-a-plastic-bag/

Paint with Water and Disappearing Handprints (PBS Plum Landing)
https://pbskids.org/plumlanding/educators/activities/pdf/evaporation_station_fam.pdf

Evaporation Station Video (PBS Plum Landing)
https://www.pbslearningmedia.org/resource/plum14.sci.life.evapstat/evaporation-station/#.WuiDg5ch3cs

Tornado in a Bottle (Wiki How)
https://www.wikihow.com/Make-a-Tornado-in-a-Bottle

Make Rain in a Jar (Learn, Play, Imagine)
http://www.learnplayimagine.com/2013/03/how-does-it-rain.html



# Writing

## Writing prompt

Think about how water makes you feel — when you take a bath or shower, play in the rain, run through a sprinkler, wade in a cold stream or swim in a pool, lake, or the ocean. Write a short descriptive paragraph that expresses the sights, sounds, smells, tastes, and feeling on your skin.

## Hurricane names

You might already know that hurricanes are given first names to identify them. The names are decided on by the World Meteorological Organization. Why do you think that scientists name hurricanes? Can you think of any big hurricanes by name?

In this exercise, you'll brainstorm a list of creative hurricane names. Be ready to talk about why you chose those names!

# Kid-friendly websites and apps

## Websites

The Blue Traveler: A Trip Through the Water Cycle (Project WET)
http://www.discoverwater.org/blue-traveler/

Climate Kids (NASA)
https://climatekids.nasa.gov/

Precipitation Education (NASA)
https://pmm.nasa.gov/education/

The Water Cycle (National Oceanic and Atmospheric Administration)
https://oceantoday.noaa.gov/watercycle/

Science Trek: Water (Idaho Public Television)
http://idahoptv.org/sciencetrek/topics/water/

Water (BrainPOP)
https://www.brainpop.com/science/earthsystem/water/

Water Science School (U.S. Geological Survey)
https://water.usgs.gov/edu/

Water Cycle Poster and Interactive Diagram (U.S. Geological Survey)
https://water.usgs.gov/edu/watercycle-kids.htm

## Educational apps

Weather by Tinybop $
https://www.commonsensemedia.org/app-reviews/weather-by-tinybop

Globe Observer
https://www.commonsensemedia.org/app-reviews/globe-observer

# Facts About Water and Rivers

There's just as much water on Earth now
as when our planet was formed.

The amount of water on Earth is constant,
but is constantly moving around and changing states.

Water is the only molecule that exists
as a solid, liquid, and gas (water vapor) at
everyday pressures and temperatures.

97% of water on Earth is in the oceans.

Water covers 70% of the Earth's surface.

Only 3% of our water is freshwater.
About 70% of that is locked in ice caps and glaciers.
The remaining 30% is stored in groundwater.

# Facts About Water and Rivers

Only 0.3% of our freshwater is above ground
(in bodies of water such as lakes, rivers, and swamps).

Wettest place on Earth: Mt. Waialeale, Hawaii.
It gets 38 feet of rain every year.

Driest place on Earth: Iquique, Chile,
where there was no rain for 14 years

Longest river in the world:
The Nile in NE Africa, more than 4,200 miles long
(the distance from Alaska to Florida)

Longest river in the U.S.:
The Missouri River (the Mississippi is second)

Deepest river in the world:
the Congo in Africa, more than 720 feet deep

# Facts About Water and Rivers

More than 1 million tons:
How much sediment the Mississippi River carries to its delta each day

9 days: how long an evaporated water molecule typically floats in the sky before falling back to Earth as rain or snow

1 hour: the average lifespan of a cloud

A jellyfish is 95% water. A baby is 78% water.
(And when you grow up, you'll be about 60% water.)

Our heart and brain are  nearly 75% water.

22 of the world's largest cities are on estuaries, including New York City and Buenos Aires.

# Facts About Water and Rivers

1 oyster can filter 4 milk jugs of water in an hour.
They clean water by filtering out algae and particles.

400 billion gallons:
amount of water used in the U.S. each day.
Nearly half of our water use is for power generation.

A family of four in the U.S.
uses about 400 gallons of water in a single day.
That's enough water to fill 10 bathtubs.

A family of four in sub-Saharan Africa uses about
8 to 20 gallons of water per day.

Drip, drip, drip. A faucet that leaks a single drop
each second wastes almost 70 bathtubs
full of water per year.

# Facts About Water and Rivers

9 gallons: the water footprint of one hour of surfing the web

330 gallons: the water footprint of one slice of pizza

400 gallons: how much water is used for a 10-minute shower

748 million people had no access to clean drinking water (2012 data). That's more than twice the population of the U.S.

90% of household water in Africa is collected by girls. A quarter of their day is spent on this task.

# Books About Water and Rivers

## Fiction

- *Bartholomew and the Oobleck* by Dr. Seuss (Gr 1-3)
- *Bringing the Rain to Kapiti Plain* by Verna Aardema (Gr 2-3)
- *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)
- *Cloudy With a Chance of Meatballs* by Judi Barrett (Gr 1-3)
- *Come on Rain!* by Karen Hesse (Gr K-2)
- *A Country Far Away* by Nigel Gray (Gr 1-2)
- *The Dam Keeper (graphic novel)* by Robert Kondo (Gr 3-5)
- *Everglades* by Jean Craighead George (Gr K-3)
- *Flotsam* by David Wiesner (Gr 1-3)
- *Flush* by Carl Hiaasen (Gr 4-5)
- *Grandfather's Dream* by Holly Keller (Gr 4-5)
- *Have You Seen My Duckling* by Nancy Tafuri (Gr K-1)
- *Heat Wave* by Eileen Spinelli (Gr 1-3)
- *Hurricane* by David Wiesner (Gr 1-3)
- *Hurricane!* by Jonathan London (Gr 1-3)
- *It Looked Like Spilt Milk* by Charles G. Shaw (Gr 1-5)
- *Kumak's River: A Tale from the Far North* by Michael Bania (Gr K-2)
- *Letting Swift River Go* by Jane Yolen (Gr 1-3)
- *Luz Makes a Splash* by Claudia Davila (Gr 3-5)
- *McElligott's Pool* by Dr. Seuss (Gr 1-3)
- *Minn of the Mississippi* by Holling C. Holling (Gr 3-5)
- *Mr. Gumpy's Outing* by John Burningham (Gr K-2)
- *Paddle to the Sea* by Holling C. Holling (Gr 3-5)
- *Pickles to Pittsburgh* by Judi Barrett (Gr 1-3)
- *Lotus and Feather* by Ji-li Jiang (Gr 2-5)
- *Make Way for Ducklings* by Robert McCloskey (Gr K-2)

# Books About Water and Rivers

## Fiction

- *Over and Under the Pond* by Kate Messner (Gr 1-3)
- *Prince William* by Gloria Rand (Gr 1-3)
- *The Raft* by Jim LaMarche (Gr 2-5)
- *Rain* by Manya Stojic (Gr 1-2)
- *Rain Drop Splash* by Alvin Tresselt (Gr K-2)
- *Rain Rain Rivers* by Uri Shulevitz (Gr K-2)
- *River* by Debby Atwell (Gr 1-5)
- *A River* by Marc Martin (Gr 1-5)
- *The River: An Epic Journey to the Sea* by Patricia Hegarty (Gr K-2)
- *The Snowy Day* by Ezra Jack Keats (Gr 1-2)
- *Three Days on the River in a Red Canoe* by Vera Williams (Gr 2-5)
- *Waiting Out the Storm* by Joann Early Macken (Gr 1-2)
- *Walter Was Worried* by Laura Vaccaro Seeger (Gr 1-5)
- *Water Boy* by David McPhail (Gr 1-3)
- *The Water Princess* by Susan Verde (Gr 1-3)
- *Where the River Begins* by Thomas Locker (Gr K-2)
- *The Wind in the Willows* by Kenneth Grahame (Gr 1-5)

# Books About Water and Rivers

## 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)
- *I Know the River Loves Me / Yo se que el rio me ama* by Maya Christina Gonzalez (Gr 1-3)
- *The Negro Speaks of Rivers* by Langston Hughes (Gr 3-5)
- *Over in a River: Flowing Out to Sea* by Marianne Berkes (Gr K-2)
- *River of Words: Young Poets and Artists on the Nature of Things* edited by Pamela Michael (Gr 1-5)
- *River Story* by Meredith Hooper (Gr K-2)
- *Song of the Water Boatman* by Joyce Sidman (Gr 1-3)
- *Thank You, Earth: A Love Letter to Our Planet* by April Pulley Sayre (Gr K-3)
- *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)
- *Watersong* by Tim McCanna (Gr K-1)
- *Weather Poems for All Seasons* by Lee Bennet Hopkins (Gr K-2)

# Books About Water and Rivers

## Nonfiction

- *Beavers* by Gail Gibbons (Gr 1-3)
- *The Big Rivers: The Missouri, the Mississippi, and the Ohio* by Bruce Hiscock (Gr 3-5)
- *A Cool Drink of Water* by Barbara Kerley (Gr K-2)
- *The Drop in My Drink* by Meredith Hooper (Gr 1-4)
- *A Drop of Water* by Walter Wick (Gr 3-5)
- *Clouds* by Anne Rockwell (Gr K-3)
- *DK Eyewitness: Pond and River* by Steve Parker (Gr 3-5)
- *DK Eyewitness: Water* by John Woodward (Gr 3-5)
- *DK Eye Wonder: Rivers and Lakes* by DK Publishing (Gr K-2)
- *Erosion* by Joelle Riley (Gr 3-5)
- *Every Last Drop: Bringing Clean Water Home* by Michelle Mulder (Gr 3-5)
- *Explore Rivers and Ponds (25 Great Projects)* by Carla Mooney (Gr K-2, Gr 3-5)
- *The Exxon Valdez Oil Spill (Scholastic)* by Peter Benoit (Gr 2-4)
- *Follow the Water from Brook to Ocean* by Arthur Dorros (Gr K-2)
- *Hurricanes* by Gail Gibbons (Gr 1-3)
- *I Get Wet* by Vicki Cobb (Gr K-2)
- *I Walk for Water* by Lindsey Andrews (Gr 1-2)
- *The Magic School Bus Inside A Hurricane* by Joanna Cole (Gr 1-3)
- *The Magic Schoolbus Inside the Waterworks* by Joanna Cole (Gr K-3)
- *Make a Splash! A Kid's Guide to Protecting Our Oceans, Lakes, Rivers, and Wetlands* by Cathryn Berger Kaye and Philippe Cousteau (Gr 3-5)
- *Marshes and Swamps* by Gail Gibbons (Gr 1-3)
- *Meadowlands: A Wetlands Survival Story* by Thomas R. Yezerski (Gr 2-5)
- *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)
- *Not a Drop of Water to Drink (National Geographic Investigates)* by Michael Burgan (Gr 4-5)
- *Oil Spill* by Melvin Berger (Gr 1-3)
- *One Well: The Story of Water on Earth* by Rochelle Strauss (Gr 3-5)

# Books About Water and Rivers

## Nonfiction

- *Otters Love to Play* by Jonathan London (Gr 1-3)
- *Our World of Water* by Beatrice Hollyer (Gr 3-5)
- *The Potomac River: A History and Guide* by Garrett Peck (Gr 5 and up)
- *A River Ran Wild: An Environmental History* by Lynne Cherry (Gr 1-4)
- *River Wild: An Activity Guide to North American Rivers* by Nancy Castaldo (Gr 3-5)
- *Rivers of Sunlight* by Molly Bang and Penny Chisholm (Gr 2-5)
- *Simple Steps Toward a Healthier Earth* by Molly Smith (Gr 1-5)
- *Swamp Chomp* by Lola M. Schaefer (Gr K-2)
- *Trout Are Made of Trees* by April Pulley Sayre (Gr 1-3)
- *Water Is Water: A Book About the Water Cycle* by Miranda Paul (Gr 1-5)
- *Water Wow! An Infographic Exploration* by Antonia Banyard and Paula Ayre (Gr 1-5)
- *Why Should I Save Water?* by Jen Green (Gr K-3)
- *You Wouldn't Want to Live Without Clean Water!* by Roger Canavan and David Antram (Gr 3-5)

# Water Words

**Absorption**
The process of being soaked up.

**Acid rain**
Rain, hail, or snow that is polluted as a result of certain chemicals and waste being released into the air. Acid rain is harmful to the environment.

**Aqueduct**
A large pipe or canal that carries a water supply to a city or a farming area. Or, a bridge with many arches for carrying water across a valley or river. The ancient Romans built enormous stone aqueducts.

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

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

**Biome**
A large community of plants and animals adapting to their environment. There are 5 biomes on Earth. Rivers, streams, ponds, lakes, wetlands, estuaries, and oceans are part of the Aquatic Biome.

**Bog**
Wet, spongy ground, full of decaying mosses that form peat.

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

**Canoe**
A narrow boat with pointed ends that is moved through the water with a paddle. Canoes are open on top.

# Water Words

**Clouds**
A mass of water vapor that floats in the sky. Different cloud types form at different altitudes and temperatures. 3 common cloud types: Cirrus: thin, wispy and feathery cloud. Cumulus: fluffy white cloud with a flat bottom. Stratus: wide, thick low-lying gray cloud.

**Condensation**
When gas cools and changes to a liquid, for example, when warm steam touches a cold window.

**Conservation**
The protection of natural resources, including soil, water, or forests, from loss, pollution, or waste.

**Contamination**
To make dirty, polluted, or unusable by adding something harmful to another substance or system. Example: some rivers have high contamination levels from chemical spills.

**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 hydropower.

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

**Drought**
A long period with little or no rain.

**Ecosystem**
A community of living things in a shared environment.

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

# Water Words

**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.

**Evaporation**
When a liquid heats up and changes to gas.

**Flood**
An overflow of water onto land that is normally dry.

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

**Fog**
A thick mass, like a cloud, made up of tiny water drops floating in the air near the ground.

**Food chain**
A series of living things that are linked to each other because each thing feeds on the one next to it in the series.

**Food web**
The interlocking food chains within a community.

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

**Ground water**
The water beneath the earth's surface that supplies springs and wells.

**Hail**
Frozen rain, or small balls of ice that fall from the sky.

# Water Words

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

**Ice**
Water in a frozen, solid state.

**Impervious surfaces**
Surfaces that don't allow water to be absorbed, including many rooftops, driveways, and parking lots.

**Indicator species**
Plants or animals whose health confirms the health of the surrounding environment.

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

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

**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.

**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 runs into a larger body of water.

# Water Words

**Municipal water supply**
Water that is provided by your local city or town government.

**Oxbow**
A U-shaped bend in a river.

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

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

**Pervious (or permeable) surfaces**
Surfaces that allow water to be absorbed, such as grass, groundcover, green roofs, and paver stones.

**Precipitation**
Water falling in the form of rain, snow, sleet, or hail.

**Pollution**
Damage to the environment caused by chemicals or dirty waste products.

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

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

**Rain**
Drops of water that form in the clouds and fall from the sky.

# Water Words

**Rain garden**
A sunken garden bed that collects and treats stormwater runoff from impervious surfaces, including rooftops, driveways, sidewalks, parking lots, and streets.

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

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

**Runoff**
Extra rainwater that is not absorbed by the ground.

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

**Sewers**
Large underground pipes that carry off the liquid and solid waste of a town or city.

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

**Snow**
Soft, white flakes of ice that fall from the sky. Snow is formed when water in the upper air freezes into crystals.

**Source**
The place where a stream or river begins.

**Spring**
A place where water comes up through the ground.

# Water Words

**Storm sewer**
A drain designed to carry away large amounts of water during heavy rains or flooding.

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

**Sublimation**
When ice changes to gas, skipping the liquid state.

**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.

**Transpiration**
When plants give off moisture into the air.

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

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

**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).

**Utility**
An important service such as water, electricity, or gas that is provided for everyone, and that everyone pays for.

# Water Words

**Vapor**
Tiny drops of water in the air; the gas form of water. Clouds are made of water vapor.

**Waste water**
Water that has been used, either in homes or in industry, and contains contaminants.

**Water**
A clear thin liquid that has no color or taste when it is pure. It falls from clouds as rain and enters rivers, lakes, and oceans. All animals and people need water in order to live.

**Water cycle**
The continuous, natural circulation of the earth's water through evaporation, condensation, precipitation, and collection in lakes, streams, rivers, and oceans.

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

**Water treatment**
Any process that improves the quality of water for drinking, industrial water supply, irrigation, recreation or many other uses.

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

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

**Well**
A deep hole dug in the ground to get water.

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

# River Ranger Name Cards

Make copies of these name tags and let child each choose their own River Ranger name. They can select from the Water Words list (Oxbow, Levee, or Meander?) or a plant or animal that lives near rivers (Cattail, Dragonfly, Hawk?).

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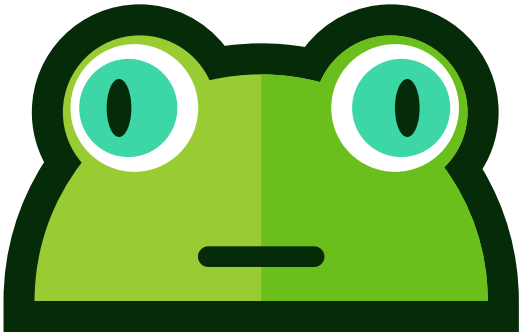
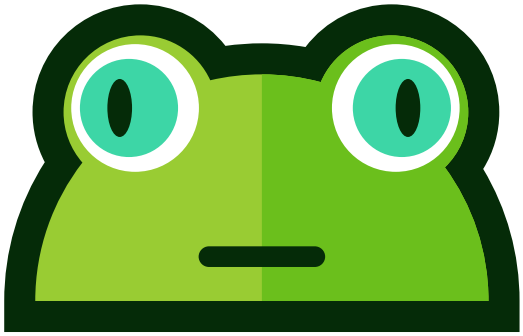
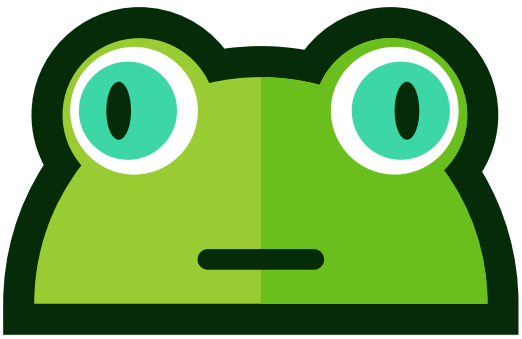
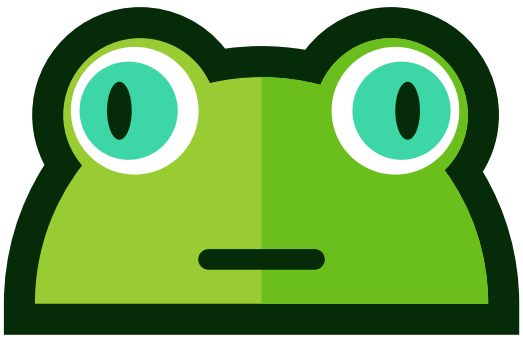
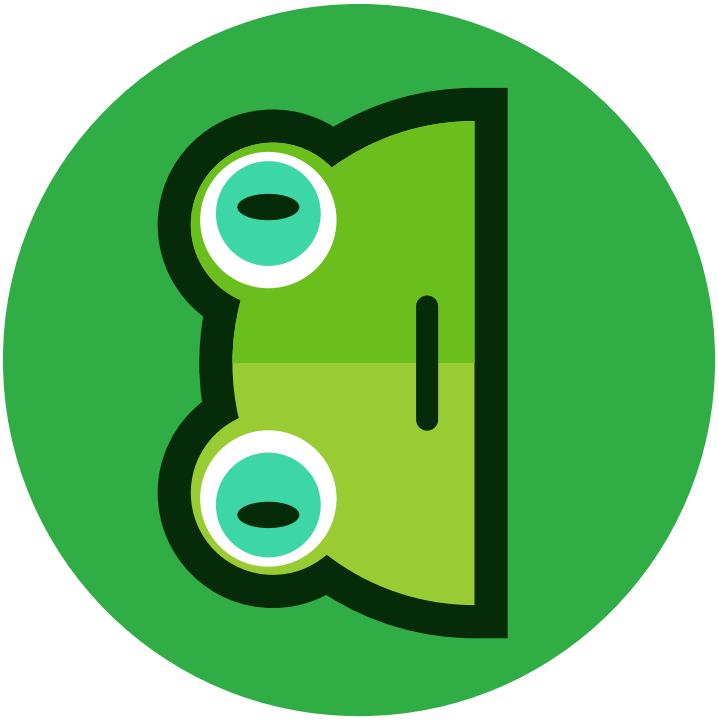
| My River Ranger name is:  | My River Ranger name is:  |
| My River Ranger name is:  | My River Ranger name is:  |

River Rangers

# Nature Journal



Your name here

Fold cover along dotted lines

# River Rangers

*This certificate is presented to:*

_____

To celebrate your participation in the Rivers Rangers program!

_____

Date Signature

# Growing readers!

*Parent tips for raising strong readers and writers from Reading Rockets*

# Reading Aloud: Fiction Books

## The basics

- Take your time and talk about the story and pictures with your child.
- Ask your child questions and let your child ask questions.
- Read with expression to create excitement.
- You don't need to read every word. Keeping your child interested is the goal.

## Try "think alouds"

When you share books with your children, they are learning to think and act like good readers — without even knowing it! You can help them get even more from reading time when you talk to them as you read.

Children learn when they can make connections between what they hear and what they know. One method you can use to help make these connections is called a think aloud, where you talk through your thoughts as you read. Here are three ways to use think alouds, with examples from some of our favorite kids' books.

### Connect the book to your child's own life experience

Example: *A River Dream* by Allen Say

"This book reminds me of the time my father took me fishing. Do you remember the time we went fishing?"

### Connect the book to other books they have read

Example: *Mufaro's Beautiful Daughters* by John Steptoe

"This story reminds me of Cinderella. Both stories are about sisters. Do you know any other stories about nice and mean sisters? Let's keep reading to find out other ways the stories are similar."

### Connect the book to big ideas/lessons

Example: *Stellaluna* by Janell Cannon

"This story helps me understand that we are all the same in many ways, but it's our differences that make us special."

### Modeling these types of connections will help young readers know how to do it when they read alone!

# Growing readers!

*Parent tips for raising strong readers and writers from Reading Rockets*

# Reading Aloud: Nonfiction Books

## The basics

- Wonder out loud. As you are reading (or afterward), talk about facts you find interesting or questions you have.
- Explore the pictures and other graphics in the book, such as charts and diagrams.
- Don't be afraid to jump around, reading pages that especially interest your child. You don't have to read a nonfiction book straight through.

## Getting the most out of nonfiction reading time

Nonfiction books give kids a chance to learn new concepts and vocabulary, as well as broaden their view of the world. Here's how to take a "book walk" with a new nonfiction book and how to model active reading.

### Take a "book walk"

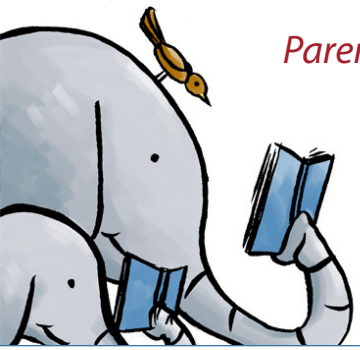
One great way to make predictions about an unfamiliar nonfiction text is to take a "walk" through the book before reading. By looking closely together at the front and back cover, the index, table of contents, the glossary, and the photographs or other images, readers can start to get a sense about the topic. This scanning and skimming helps set the expectation for the reading. Take the time to walk through the book before starting to read.

### Encourage questions

A second way to develop more understanding with nonfiction books is to encourage your child to be an active reader who asks lots of questions. Parents can model these behaviors by talking or thinking out loud as you turn the pages of the book. This is a helpful way for your child to see and hear what a successful reader does when faced with difficult or unfamiliar topics.

For example, "When I looked at this photograph, I asked myself, "Where is Antarctica? Is that the same place as the South Pole?" Then talk together about how and what you would need to do to find the answer to the questions. This will reinforce that many questions can be answered by reading a text closely and by paying attention to captions and picture titles. Some children enjoy writing their questions on sticky notes and working to answer them during the reading.

Previewing a text and asking questions are two terrific ways to navigate nonfiction texts. Enjoy spending more time with some fascinating informational books!



*Parent tips for raising strong readers and writers*

# Growing readers!

***Brought to you by Reading Rockets, Colorín Colorado and LD OnLine***

**Literacy in the Sciences:** Activity No. 14

## How to Read Nonfiction Text

Kids love to read about real people, places, and events. Nonfiction books present real information in engaging and interesting ways. However, most kids read a lot more fiction than nonfiction, so spend some extra time helping your reader learn how to navigate a nonfiction book.

### Talk about nonfiction

Begin by explaining that the book you're about to share is nonfiction. That means that the book will give us information that is true. The book will be organized around a specific topic or idea, and we may learn new facts through reading. Some kids even enjoy sorting their home libraries into fiction and nonfiction books. This simple categorization task helps your child understand the difference between fiction and nonfiction.

### Look at the parts

Most good nonfiction books will have helpful features that are not a part of most fiction books. These parts include a table of contents, an index, a glossary, photographs and charts with captions, and a list of sources. Share the purpose of the features with your reader.

- **Table of Contents:** Located at the front of a book, the table of contents displays a list of the big ideas within the book and where to find them.
- **Index:** An index is an alphabetical list of almost everything covered within the book, with page numbers. Readers can use the index to look up specific terms or concepts and go right to the specific information they're looking for.
- **Glossary:** Located at the back of the book, a glossary contains key words that are related to the topic and their definitions. These definitions provide more information about new vocabulary words.
- **Captions:** Captions are usually right under photographs, figures, maps, and charts. Captions give a quick summary of what information is presented in the graphic.
- **Photos and Charts:** A lot of information can be found by "reading" the charts and photos found within nonfiction text. Readers will first need to figure out what information is presented. Then they'll need to discover how to navigate the information. Some charts use clear labels, others require more careful examination. Help your reader learn more about the different ways information can be displayed.

### Be the reading boss

Nonfiction books do not have to be read from cover to cover. Readers can use the table of contents and index to jump right to the information they are most interested in. In that way, they are the "reading boss" of that book! However, if your reader wants to read from cover to cover, encourage him to use the table of contents to understand how the book is organized. "First we will learn about the different types of frogs. Then we'll learn where they can live, what they eat, and how they survive." Passages from the book can be reread as often as necessary until your child understands what is written. You can refer to pictures, charts and tables over and over again as well.

As natural learners, young readers are drawn to books that give information about something or explain something they've always wondered about. With a little help and guidance about reading nonfiction, you can feel good about introducing your child to a new world of information.

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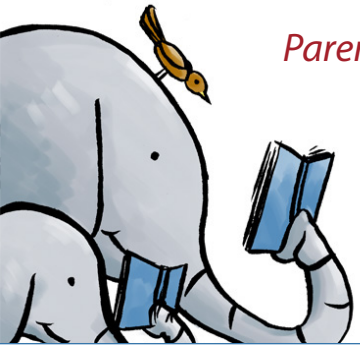

*Parent tips for raising strong readers and writers*

# Growing readers!

***Brought to you by Reading Rockets, Colorín Colorado and LD OnLine***

## Summer Literacy Challenge!

For most parents, it's a challenge to keep kids reading and writing all summer. Suddenly 10 weeks of summer can feel like a very long time! We've got a summer literacy challenge for you and your child. It's modest enough to be manageable –pick just one thing a week to kick start your week's literacy adventures. But it's also challenging enough to include a wide range of literacy fun for the whole family.

- **Investigate your public library's summer reading program.** Most libraries offer a special program or two during the summer, including puppet shows, book authors and children's storytellers. Most are free of charge.
- **Extend your reading circle.** We often find ourselves checking out the same types of books over and over again. This week's challenge is to bring a new type of book into the house. Consider fantasy or science fiction, historical fiction, poetry, biography, or an informational book.
- **Listen up!** Audiobooks are a great way to engage readers and can introduce students to books above their reading level. Many libraries have audiobooks available for check out, and an Internet search can turn up several sites, including Speakaboos.com, that offer free audio books for children.
- **Make your own audio book!** Most phones and computers have simple recording apps on them which are perfect for making homemade audio books! Have your child make up a story, or reread a favorite loved book. The recordings will be priceless!
- **Go wordless.** Wordless picture books are told entirely through their illustrations — they are books without words, or sometimes just a few words. Grab a few wordless books the next time you're at the library and have fun "reading" different versions of the same story. The language and the conversation will inspire you!
- **Visit a museum, online!** You'll be surprised by how much you can explore without leaving your house. One example is the Smithsonian Institution Kids site. It's complete with offerings from Art to Zoo, for kids and students of all ages.
- **Pack in a whole adventure!** Find FREE themed reading adventure packs that encourage hands-on fun and learning, centered around paired fiction and nonfiction books. Visit Reading Rockets and search Adventure Pack.
- **Point, shoot, and write.** Most families have access to a digital camera, iPad or camera phone. Snap some photos and then encourage your child to write a silly caption for each photo. Not feeling that ambitious? Cut out some pictures from a magazine or the newspaper and have your child write original captions for those.
- **Mix up the media.** Your child has read every Clifford book on the shelf. But has she heard Clifford author Normal Bridwell talk about writing? Explore author interviews from over 100 authors on Reading Rockets Author Interview page. We'll bet you can't watch just one.
- **Write it down.** Encourage your child to keep a simple journal or summer diary. Track interesting things like the number of fireflies seen in one minute, the number of mosquito bites on a leg, or the different types of food that can go on the grill. Each entry is a chance to be creative!

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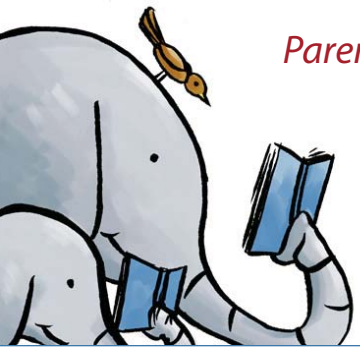

*Parent tips for raising strong readers and writers*

# Growing readers!

***Brought to you by Reading Rockets, Colorín Colorado and LD OnLine***

**Literacy in the Sciences:** Activity No. 4

## Making Predictions

As a young reader, your child is learning to make predictions while reading. "What do you think will happen next?" "Who do you think drank Sara's lemonade?" These types of questions we ask children as they're reading help them learn to monitor their understanding of the story while thinking ahead to the next part. If your child is able to make good and fairly accurate predictions while reading, chances are she comprehends the story well.

Scientists, just like readers, make predictions all the time. In fact, scientists use predictions as part of their hypothesis, or question they try to answer through their experiments. Help your child begin to see the connection between what she does as a reader and what she can do as a scientist.

Below are two simple ways you can encourage your child to put her prediction skills to work as a scientist:

1. **Play favorites.** What is our family's favorite flavor of ice-cream? What is our favorite movie to watch together? What is our favorite bedtime story? Choose a question, or make up your own, that your child is excited about. First, have your child predict or guess the answer to the question. Help her write down her prediction. "I think chocolate is our family's favorite flavor of ice cream." Then, have your child ask each member of the family for an answer. Have your child record the answers using a special Science Notebook or simply mark tally marks on paper. Finally, ask your child to compare her prediction to the actual answers.

2. **Good guess!** Estimation is often very similar to a prediction. In both cases, your child will be working to make a good guess about an answer. As with our Play Favorites idea, encourage your child to write down (or write together) the questions and answers in a special Science Notebook. Whenever possible, encourage the use of scientific words like estimation, predication, collect data, analyze, and prove. Here are some estimation questions that require your child to make a prediction:

    - How many noodles will it take to fill up this jar? Encourage your child to use scientific language and thinking to answer. "I predict it will take 300 noodles to fill the jar."
    - How many steps is it from our front door to the mailbox?
    - How much does our dog weigh?
    - How many library books fit on one shelf?
    - How long do you think it will take for the ice cubes to freeze (or melt)?

We predict your child will have great fun with these activities! And you can have fun knowing that you're helping your child make important connections between the skills of prediction, reading, and science.

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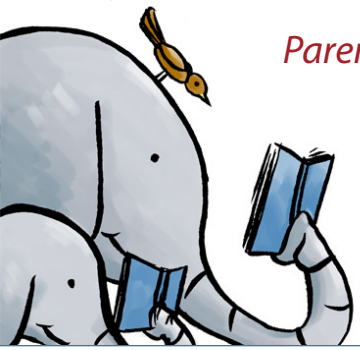


*Parent tips for raising strong readers and writers*

# Growing readers!

***Brought to you by Reading Rockets, Colorín Colorado and LD OnLine***

**Literacy in the Sciences:** Activity No. 11

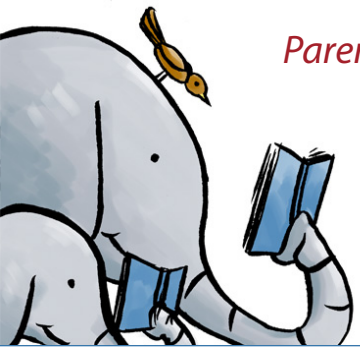
## Making Inferences and Drawing Conclusions

Observations occur when we can see something happening. In contrast, inferences are what we figure out based on an experience. Helping your child understand when information is implied, or not directly stated, will improve her skill in drawing conclusions and making inferences. These skills will be needed for all sorts of school assignments, including reading, science and social studies. Inferential thinking is a complex skill that will develop over time and with experience.

Families can create opportunities to practice inferential thinking. Below are a few ways to help familiarize your child with this way of thinking and learning:

- Explain to your child that we make conclusions about things and draw inferences all the time. Draw a conclusion together and then talk about what clues were used to come to that conclusion. For example, Erin played outside today. How can we tell? Muddy shoes, jump rope on front porch, water bottle out. Dad seems tired tonight. How can we tell? He's rubbing his eyes, he's on the couch, he was yawning at the dinner table.
- Paper bag mystery person: Put a few items into a brown paper bag. Tell your child the bag belongs to a certain type of person. Their job is to tell you something about the person. Then, take out each item one by one and talk about it.
  - Example #1: goggles, a swim cap, a swim ribbon, a stop watch
  - Example #2: a bookmark, a library card, a stuffed animal, a book
- Wordless picture books provide your child with practice using clues to create meaning. There are no wrong stories with wordless picture books, only variations based on what the "reader" sees and puts together. *Rosie's Walk* (Hutchins), *Good Dog, Carl* (Day), and *Beaver Is Lost* (Cooper) are all interesting and fun wordless picture books to explore.
- Play twenty questions! This familiar word game helps build inference skills. As your child develops skill with the game, encourage him to avoid asking direct questions like, "Is it a dog?" Rather, encourage him to ask broader questions, "Does it walk on four feet?" Then, when your child figures it out, ask him to tell you the clues that lead to the right answer.
- Create scenarios in which your child must use what they already know to predict an outcome. For example, growing seeds. Present your child with various scenarios (a seed will be given water and sunlight, a seed will get no water, a seed will be in a dark room). Ask your child to predict whether the seed will grow. Help your child become aware that she used information she knew about growing seeds, combined with new information, to fill in information about the seeds.

Learning to draw conclusions and inferences is a skill that develops over time. The skill requires children to put together various pieces of information, and relies on good word knowledge. Help your child develop skill by providing experience with inferential information, making implied information more clear, and helping your child draw conclusions based on the evidence.



*Parent tips for raising strong readers and writers*

# Growing readers!

***Brought to you by Reading Rockets, Colorín Colorado and LD OnLine***

**Literacy in the Sciences:** Activity No. 6

## Recording Observations

Science and math explorations provide your growing reader with a chance to record all kinds of observations. Young children love to keep a special journal, and fill it with all sorts of drawings, scribbles, sketches, notes, and graphs. Try to date each entry and watch as your child's observational and recording skills grow along with your child.

### Create a special journal

Use any paper for the cover: cardstock, interesting cardboard and pretty greeting cards can all be used as a cover. Then, collect some twigs from the backyard and find a large, thick rubber band. Fold your cover in half. Fold your inside pages, and put them inside the cover. Trim as needed. Punch two holes with a hole punch, measuring down from the top and up from the bottom about 2 inches. Pull one end of the rubber band through the bottom hole and slide twig into the loop. Pull the other end of the rubber band through the top hole and slide the other end of twig through that. You now have a special journal into which your budding scientist can record observations.

### A scientist's field notes

Begin using the science journal by taking your child outside. Encourage your child to write down what she observes about her surroundings, looking at both the big picture and the small, examining plants and rocks and insects up close. Have her make a record in their journal of what they experience with each of their senses. Then have her choose one animal or plant to watch for 10 minutes. Your child can choose anything: a dandelion, a grasshopper, a bird soaring overhead. Ask her to describe it as clearly as they can, as if she is writing for someone who's never seen that before. Have her watch for movements and take note of any sounds made. Ask your child to draw and label a picture of the plant or animal.

### Other fun ideas to record in your field journal

**A flower tally:** Count the flowers in an area in the spring once a week for three weeks. Compare your tallies. Your child will have fun watching the numbers go up as flowers bloom in the spring.

**Ant watching:** There are ants everywhere! Try following them to their home and see what they're up to. Where do they live? How many can you count in one place? Record these observations and your ant grand total.

**Dig a hole:** As parents know, dirt can be pretty interesting to kids. Have your child dig a hole and notice how the dirt changes as he digs deeper. Can he describe the different layers? What creatures did he find as he dug? Record these and other interesting findings in the journal.

**Nature scavenger hunt:** Use your notebook to make (or draw) a list of some common things and a few rare ones that can be found outside near your home or in a park. Include things like: acorn, pine cone, flat rock, bird feather, weed, flower. Hand your child the notebook and let the scavenger hunt begin!

Special thanks to the Two Writing Teachers (www.twowritingteachers.wordpress.com) for their field journal directions, and Nature Rocks (www.naturerocks.org) for the nature-based ideas for family fun.