

Nature Activities

The Water Cycle

Lesson adapted from Classroom in Bloom's curriculum and the Seeds to School Curriculum Guide.

Earth has a fixed amount of water in a closed system, which means that water is not added or lost on our planet. It moves in a continuous cycle, constantly recycling itself.

The sun's heat causes water to *evaporate* from streams, lakes, oceans, rivers, irrigation ditches, and sprinklers. The water vapor rises. When it reaches cooler air, it *condenses* to form clouds. When the clouds are full of water, or saturated, they release some of the water as *precipitation*. Rain water trickles down from the hills into creeks, streams, lakes, and rivers as it heads for the ocean.

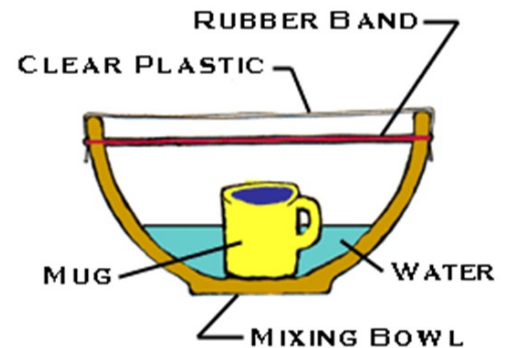
For this activity you will need a large bowl (or quart-sized canning jar), a coffee mug (or pint-sized canning jar), a sheet of clear plastic wrap that will cover the large bowl, a long piece of string or rubber band, and water.

Add water to the large bowl until it is about a quarter full, place the empty mug in the center of the bowl without splashing any water into it. Cover the top of the bowl tightly with plastic wrap and tie the string or place the rubber band around the bowl to keep the plastic wrap in place. Place the bowl in a sunny location and watch the bowl to see what happens! To speed up the process use warm water and/or move the bowl to a shady spot after it has been in the sun for some time.

Is the coffee mug still empty? Water from the "ocean" of water in the bowl evaporated. It condensed to form misty "clouds" on the plastic wrap. When the clouds became saturated it "rained" into the mug! Where else do you see examples of the water cycle in your everyday life? Some examples are shower steam, kettle steam, morning dew on grass, and your breath on cold mornings.

Questions? Want more hands on, outdoor activities and lessons?

Contact Kim Kogler at kimberly@okanogancd.org





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The Water Cycle

P R E F F T N L V Q R Y T U W
R T R V I I Z T F B H L C W N
E C O Z A U Z F U G Q Y P O D
C L S R G P O S X D Q G I G F
I O H C T N O X X G L T U K K
P U C O U K C R J W A F P N X
I D X R C J D O A S W A T E R
T S T O S I M X N T T X X J K
A C A D C Y H E L Z I K E Z Z
T V A R Q E D Z G Z Z O E G M
I R B N P N A Q C F U D N Z Z
O I T U O O Q N H I T G F T E
N V D C O I T A R T V A P O R
F E G I N F I L T R A T I O N
X R W L A P P I W S U N M X Y

CLOUDS

INFILTRATION

RAIN

WATER

CONDENSATION

OCEAN

RIVER

SUN

EVAPORATION

PRECIPITATION

RUNOFF

VAPOR

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Answer key on next page.



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The Water Cycle: Answer Key

P	R	E	F	F	T	N	L	V	Q	R	Y	T	U	W
R	T	R	V	I	I	Z	T	F	B	H	L	C	W	N
E	C	O	Z	A	U	Z	F	U	G	Q	Y	P	O	D
C	L	S	R	G	P	O	S	X	D	Q	G	I	G	F
I	O	H	C	T	N	O	X	X	G	L	T	U	K	K
P	U	C	O	U	K	C	R	J	W	A	F	P	N	X
I	D	X	R	C	J	D	O	A	S	W	A	T	E	R
T	S	T	O	S	I	M	X	N	T	T	X	X	J	K
A	C	A	D	C	Y	H	E	L	Z	I	K	E	Z	Z
T	V	A	R	Q	E	D	Z	G	Z	Z	O	E	G	M
I	R	B	N	P	N	A	Q	C	F	U	D	N	Z	Z
O	I	T	U	O	O	Q	N	H	I	T	G	F	T	E
N	V	D	C	O	I	T	A	R	T	V	A	P	O	R
F	E	G	I	N	F	I	L	T	R	A	T	I	O	N
X	R	W	L	A	P	P	I	W	S	U	N	M	X	Y

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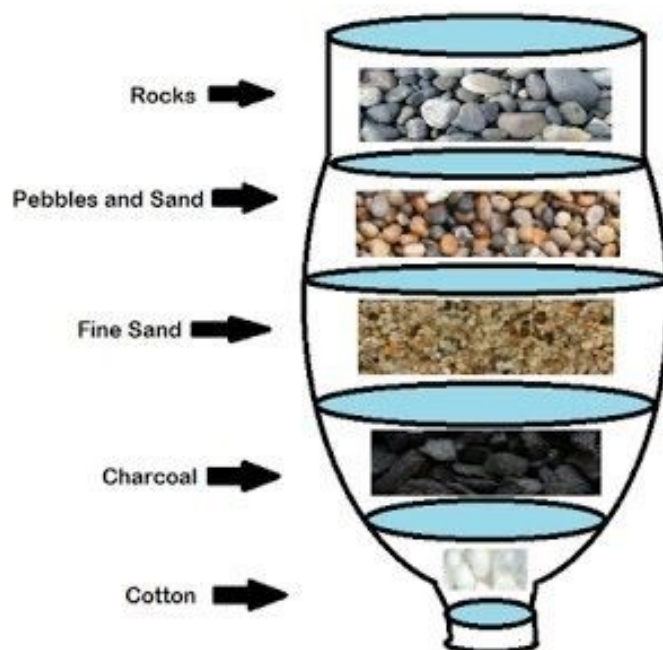
Nature Activities

Create Your Own Water Filter

Dirty water can make us sick, so we have created methods of *filtering*, or cleaning, the water we drink. It is not just humans that need clean water, though. Sometimes, the rivers carry a lot of *sediment*, or dirt, in them and it can harm animals in the water. When rivers look brown from extra sediment, they are *turbid*. Turbid rivers have less oxygen than clear rivers, so salmon eggs and other life cannot live as well. It is difficult for prey, like young salmon to see predators and hide in turbid water. Finally, turbid water is hotter than clear water because the extra sediment absorbs heat. Like humans, nature has also created its own method of filtering the rivers—tree roots, rocks, gravel, and large logs all help filter rivers.

For this experiment you will need a liter bottle, scissors, dirty water (using mud and organic matter), a glass cup or mason jar, and a variety of filtering items. Possible at home filtering items are coffee filters, old socks or pieces of cloth, cotton balls, activated charcoal (what you use in fish tanks), grass, roots, sand, pebbles, gravel, and small rocks. Organize these items from smallest pore size (coffee filter, cloth, cotton balls) to largest pore size (rocks).

Cut the bottom 2-4 inches off the bottle and place it aside. Place the bottle so that the top is facing down. If you have a coffee filter or cloth, place it around the bottle opening and use a rubber band to secure it in place. If you gathered a cotton ball, poke a hole through the cap, screw the cap back on, and place the cotton ball inside the bottle, resting right against the cap. Then, place your other materials in layers in the bottle, using the smallest sediment first (sand) and ending with largest sediment (rocks).





Nature Activities

Create Your Own Water Filter (continued)

Place your bottle on top of the glass cup or mason jar, ensuring that it is well balanced. You may need to keep a hand on it so it does not tip over. Pour the dirty water into your filter. The water should move slowly through the filter. If it moves too fast, you may need to add more small sediment (like sand) or create thicker layers of each type of sediment.

Compare the water that you put into the filter and the water that came out. What do you notice? What happened to the sediment originally in the water? Observe the different layers. What do you notice? You can even pour the layers out and look more closely at each layer to see which sediment was trapped in each layer. Does this remind you of something else you have observed before?

*Note: do not drink science experiments. What might your filter not remove from the water?

Extensions: create multiple different styles of filters to test against one another. Hypothesize which filter will trap the most sediment and why. Test and evaluate: which filter trapped the most sediment? What happens if you time it? Is there a difference in how quickly the water moves through each filter? Is there a difference between how quickly the water moves through the filter and the cleanliness of the water?

Resources:

<https://www.youtube.com/watch?v=6Z3JBH-Hg8w>

<https://www.wikihow.com/Make-a-Water-Filter>

<https://www.youtube.com/watch?v=G5b52jZLIRA>

<https://kids.nationalgeographic.com/explore/books/how-things-work/water-wonders/>



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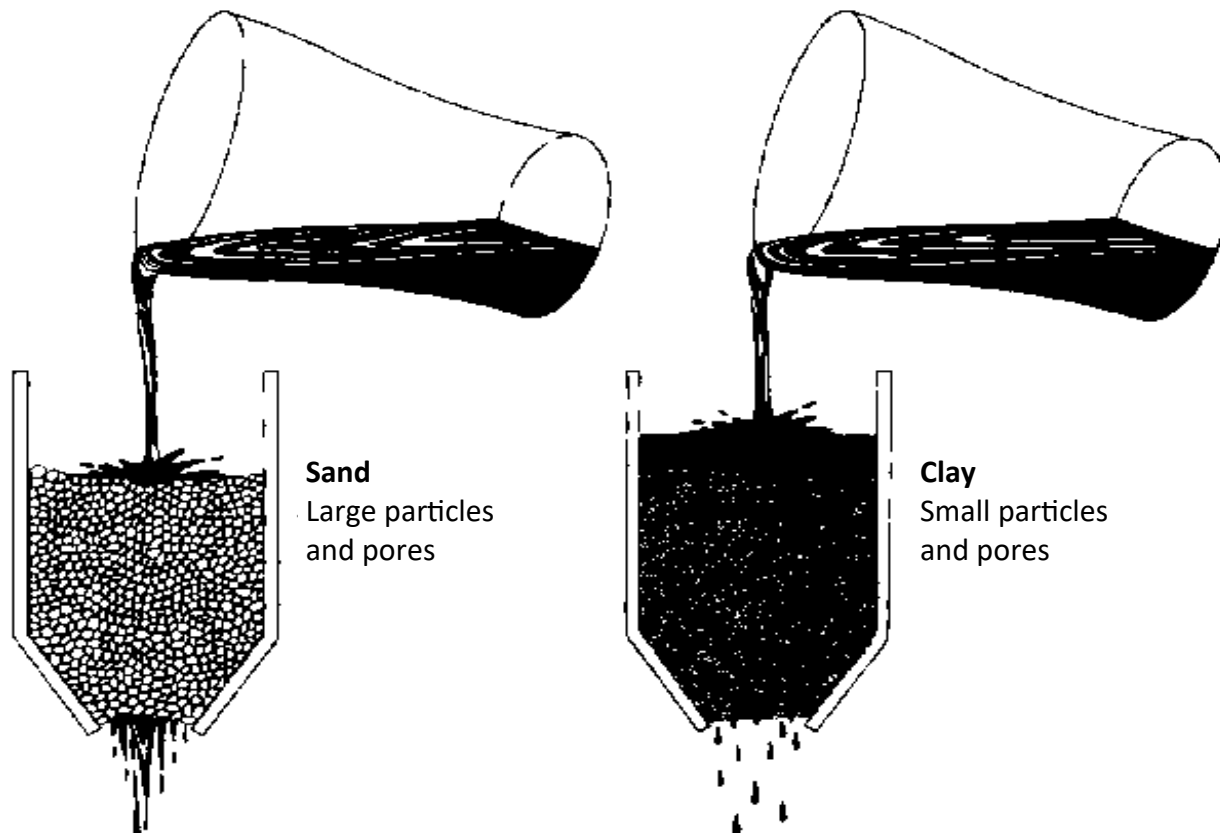
Contact Kim Kogler at kimberly@okanogancd.org

Nature Activities

Water Infiltration Test

Activity compiled from various "Percolation Tests" online.

Water moves in a continuous cycle, constantly recycling itself. The sun's heat causes water to *evaporate* from streams, lakes, oceans, rivers, irrigation ditches, and sprinklers. Evaporated water rises into the air as water vapor. When it reaches cooler air, it *condenses* to form clouds. When the clouds are full of water, or are saturated, they release some of the water as *precipitation*. When the water hits the ground it either flows downhill as *run-off* or it sinks into the ground as *infiltration*.



The speed at which water infiltrates, or drains, through the soil depends on the type of soil. Often, water infiltrates slowly through soil that has a lot of clay and quickly through soil that has a lot of sand because there is more space for water between each sand particle. Plants need just the right amount of water, so it is important that the water drains at the right speed. In this experiment, you will test how quickly water drains in the soil around your house or at a location you have approval to dig a hole. You will need a shovel, a watch, water, and a yard stick or ruler.

First, dig a circular hole with straight walls that is 12 inches deep and 12 inches wide. To get a more accurate representation, you could dig several holes scattered around the project area. If time allows, fill the hole with water the night before. This saturates the soil and increases the accuracy of the test. The next day, refill the hole completely with water. Place a yard stick or ruler in the hole and measure water height at the beginning and end of an hour. The difference between the water height at the beginning of the hour and at the end of the hour is called the infiltration rate. The infiltration rate is usually measured in inches per hour.



For context, the ideal soil drainage is around 2 inches per hour. Readings between 1-3 inches is sufficient for plants that have average drainage needs. If the rate is less than 1 inch per hour, your drainage is too slow and only plants tolerant of wet soil will survive. If drainage is more than 4" per hour, the water is draining too fast, the soil will dry quickly, and only plants tolerant of dry soil will survive.

Lead a discussion with those participating. What did you notice? Did it remind you of something else? What happened to the water? Where do you think it went? If the water infiltrates soil really fast, how might that impact the soil and plants? What if the water infiltrates very slow? How could we change the soil to make the water infiltrate slower or faster through the soil? (add compost, mulch, sand, top soil, plant trees)

*Extension: Measure the water each hour for multiple hours in a row. Then, find the average over time. Did the infiltration rate change over time? Make a graph showing the results.

Resources:

[https://extension.tennessee.edu/Williamson/Horticulture/Consumer%20Horticulture/DIY%20Soil%20Drainage%20Perk%20Test%20for%20Your%20Yard%20\(2016\).pdf](https://extension.tennessee.edu/Williamson/Horticulture/Consumer%20Horticulture/DIY%20Soil%20Drainage%20Perk%20Test%20for%20Your%20Yard%20(2016).pdf)

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Salmon Life Cycle Guided Imagery

Lesson adapted from Salmon in the Schools activities: <https://sisseattle.org/learning/>

Research has shown that guided imagery helps relieve stress and anxiety. In this activity, one person will slowly read the following script to another individual or group of individuals. This activity can be done outside or inside. YouTube has relaxing river sounds that could be played in the background to further encourage the imagination. Once you complete the story, you can lead a discussion about the salmon life cycle using the questions on the last page. Depending on the participants attention span, speakers can take a break on the second page after, “You will remember this place.” and return to the guided imagery later. The script takes about 8 minutes to read, depending on your reading speed.

Begin reading:

Take a moment to get comfortable. Gently close your eyes and take a deep breath in...and out... Do this several times and allow your body to get more relaxed with each breath. Notice how peaceful your body feels as you breathe deeply. As you relax, I am going to guide you through an adventure—the life of a salmon.

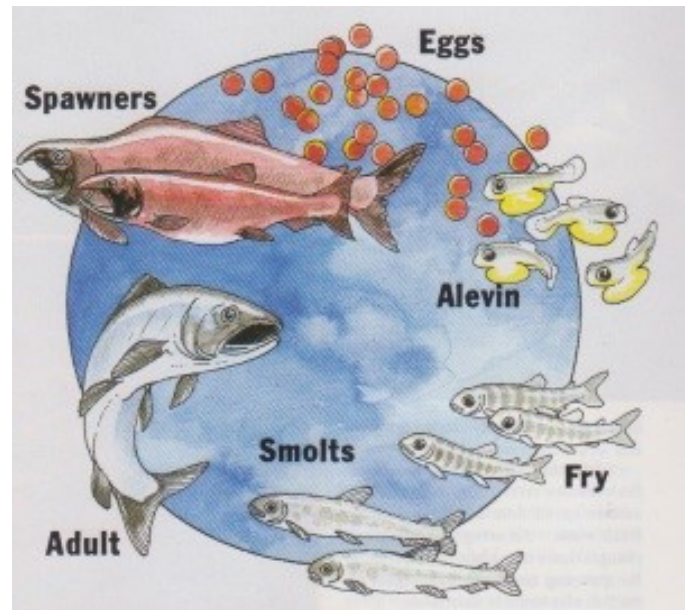
Imagine yourself curled in a small ball. You are squeezed inside an egg case the size of a green pea. You cannot see anything. You only feel. Cool water rushes around you, bringing you fresh, clean water and oxygen. Small rocks secure you on all sides, keeping you in place despite the strong current pushing against you. You only sway a little left and right. The days continue and you start to feel more cramped in your shell. Moving and turning is no longer easy. You push against your shell with your head and tail and...POP! Your head breaks through the shell. You are free! A free and very small alevin, or baby salmon.

As an alevin, you can see! Although everything is rather blurry. You look down and see that your belly is very round. It feels like someone strapped a bowling ball around your middle. It is difficult to move. That bowling ball is your food and you have enough food stored in your belly to help you grow into a strong fry. Day by day, your belly shrinks and shrinks. Until one day, it completely disappears. You are officially a fry!

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As a fry you can move a lot easier! You wiggle your tail back and forth and swim cautiously around the rocks. As you become more confident in your swimming, you push your tail hard and leave your pile of rocks behind. The current takes you down river. You see a log to your right. Perfect cover for you to hide from animals that will eat you and to watch for insects that you will want to eat. You steer yourself right and slip under the log. The log slows the water so it is barely moving, giving you a chance to rest.

Once you catch your breath, you realize a rumbling and grumbling in your belly. You are hungry! You look out from under the log and you see a small insect nibbling on algae. You look out and see nothing around you. In a quick second, you dart out, grab the insect and swim back under your log. **WHEW!** Made it! You're still hungry, though. You see some more floating insects. Dart, retreat...dart, retreat. You spend a year in your river – hiding, eating, and surviving.



The spring after you hatched, you look down at your body and are surprised. It used to be a dark green color, with several big black spots along the side. You blended in with the brown-green color of the water and rocks beside you. Now, however, the spots are fading and you are turning silver! You are turning into a smolt—a teenage salmon. It is time to go downstream, before you stand out too much with this shiny new look. As you move down river, you take in all the sights and smells of your home. You will remember this place.

During your trek downstream, barriers and predators will challenge your strength and stealth. Your first challenge is a large concrete wall that blocks the path of both you and the river. You swim along the wall until you see an opening and many other smolts. You follow them through the opening and travel down a dark passage, down, down. Until suddenly, you pop out on the other side of the dam! You notice that with so many fish in one place, birds are diving in the water trying to catch their lunch. In a flash, you make your way safely into deeper water and travel from hiding place to hiding place, continuing downstream. Each river you travel joins another river and the river becomes larger and larger.



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One day, you start to feel a change in the river and in your body. The water tastes saltier, but you do not mind it. You hear a pounding boom through the water every few seconds from the ocean's waves. Avoiding the ruckus, you travel beyond where the waves are crashing, but still close to shore. Here, you see thousands of small fish, perfect for lunch! You notice jellyfish floating through the water and crabs that scurry from rock to rock. Sea grass and seaweed sway in the waves' currents and you enjoy swimming through them, feeling the tickle along your sides. You are now completely silver and you notice that the silver blends in with the clear ocean water.

As you grow bigger, eating meals of small fish, you decide to travel to deeper water away from the beach. You swing your tail strongly back and forth and make your way to greater depths. The fish around you are bigger, but so are you! You catch herring and squid, relishing in the diversity of flavors and textures. You swim next to jellyfish and away from large orcas that love salmon for breakfast. Occasionally, you swim through water that smells bad and feels gunky as it goes through your gills. You try to avoid that water! You also notice plastic bags and old balloons that look a lot like jellyfish but are not.

Years go by and you grow to be the size and weight of a one-year old human. You feel ready to return to where you grew up and decide to follow the same path that led you to the ocean, but in reverse. You swim towards the beach, with the tickly sea grass and seaweed. When the water is high enough, you enter the river that smells a little like home. Other adult salmon surround you; they are returning to their home streams too! Your body changes again as the saltwater turns to freshwater. You are no longer hungry. Instead, you feel an intense urge to return home quickly and lay your eggs. It is time.

You swim past rocks and fallen trees, through rapids, and jump over waterfalls in your quest to return home. You see many different streams that other salmon travel towards, but none of them remind you of your home. Then, you run into the dam! You travel along the side until you feel a fast current like a waterfall. You jump up and slowly swim your way up a fish staircase...up, up over the dam! Further on, you come to a side stream that smells even more like your home. Look! There is the fallen tree that you used to hide under when you were a small fry. It is nice to be home.



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You are tired from your long journey and can see many cuts and scars on your body. Those cuts tell a story of near deaths from predators and hard work swimming upstream. They remind you of your strength and luck. Of the nearly 5,000 eggs in your redd, or nest of eggs, only three of you returned home! You feel lucky that you made it home and that three of your family made it home. In some neighbor redds, only one salmon returned.

You search along the shallow water to find a spot that has small rocks to bury your eggs as you were buried. There, you see it! You beat the water with your tail to clear the sand and make a bowl in the small rocks that will hold your eggs. Your partner salmon joins you at the nest. You lay the thousands of eggs that you carried all the way from the ocean. Your partner salmon releases a white cloud of sperm that will fertilize your eggs.

Finally, feeling exhausted, you find some quiet water near the nest to rest your head. You have not eaten since you left the ocean and it finally caught up with you. You take one last deep breath... and as you exhale you think of your baby salmon. Your body will nourish the stream, providing food for the insects that your babies will greatly need. You think of the adventures those small alevins will have as they grow to fry, to smolts, and then travel to the ocean and become strong adults. What a cycle to be a part of!

Take another deep breath and return to the present. You traveled far as a salmon! When you are ready, open your eyes.

Discussion questions: Tell me about your journey! How did you feel? What did you notice as a little salmon? What surprised you on your journey? What were some challenges you experienced? How do you think we could help make a salmon's journey easier? What questions do you still have about the salmon life cycle? How might you explain the salmon life cycle to a friend or family member?

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