The Water Cycle
Lesson Plan

Grade Level: K-2

Objective:

1. Students will be able to describe the 3 main stages of the water cycle and how it affects living things.
2. Students will be able to see the 4 stages of the water cycle in their daily life.

NGSS Standard:

MS-ESS2.C-4 Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.

Materials Needed:

1. Sandwich Ziploc bags
2. Black Sharpies
3. Water
4. Blue food coloring
5. Electric water heater
6. Water cycle worksheet

Teacher Prep:

1. Vocab cards for Evaporation, Condensation, and Precipitation
2. Start heating water before lesson.
3. 1 copy of worksheet for each student
4. Find a window on campus that gets sunlight.

Introduction:

"What is a cycle?" Take student responses. Then directly teach. "A cycle is a process that repeats itself over and over again. For example, every day, we have daytime and nighttime. When nighttime is over, then it goes back to daytime. Then after daytime it goes to nighttime. It repeats itself over and over."

- "Does anyone know of another cycle we have in nature that occurs on Earth?" Take students' responses and share more if needed. (Seasons, weekdays, months, plant life cycle, animal life cycle, etc.)
- "The way our water moves around Earth also happens in a cycle. Does anyone know anything about the water cycle?" Take students' responses and see what they know.
- "Now that I have heard what you already know about the water cycle, I am going to teach you the 3 main stages. Water goes through evaporation, condensation, and precipitation. Can you say evaporation?"

Display a large spelling of evaporation. "Evaporation is when the sun heats liquid water into a gas called water vapor. The water vapor rises into the sky. We need a hand motion for this new big word. Can anyone think of one?" Use students' ideas to come up with something that looks like water evaporating, simple and easy! "Okay next we have condensation." Display vocab card. "Can you say that? This is when water turns BACK into a liquid and forms water droplets. Big water droplets in the sky are called clouds. We need a hand motion for this new big word. Can anyone think of one?" And lastly, we have precipitation." Display vocab card. "Precipitation is when water falls from the clouds. We call this rain or snow! We need a hand motion for this new big word. Can anyone think of one?"

- "Okay now that we have our hand movements down let's review them. When you hear me say the word, do the hand movement that matches. First, the sun heats up liquid water on the Earth and turns it into a gas called water vapor. This is EVAPORATION *(students should do the movement and say the word).* Then the water vapor turns back into a liquid and collects as big water droplets in the sky called clouds. This is CONDENSATION *(students do the movement and say the word).* Lastly, the clouds release the liquid water, and it falls as rain or snow. This is PRECIPITATION *(students do the movement and say the word)."*

- "Let's try it with a video! I am going to show a video and when you hear the vocab word. Do the movement with it." View video at https://www.youtube.com/watch?v=s0bS-SBAgJI

- "Turn and talk to your partner. What are the 3 main steps of the water cycle?"

Activity Steps:

"Today we are going to make the water cycle in a plastic bag!"

Pass out a Ziploc bag and a Sharpie to each student. Display your bag on the screen and have students follow as you draw. Draw a large body of water at the bottom and a sun and cloud on the top.

1. "What is the first step? Evaporation, yes! Let's draw this with arrows going up from the ground to the sun. We will mark it with an E for evaporation."

2. "What is the second step? Condensation, yes! Let's draw this with a big cloud filled with water droplets. We will mark it with a C for condensation."

3. "What is the last step? Precipitation, yes! Let's draw this with rain falling. We will mark it with a P for precipitation."

4. "I am going to fill your bag with warm water and then we are going to zip it closed and tape it on a window in the sun. Using what you learned so far, what do you predict will happen in the bag?"

Listen to students' predictions. Fill every student's bag with a drop of blue food coloring and warm water. Tape each bag on a window with lots of sunlight.

5. "While we wait for the water to heat up from the sun, we are going to document what we have done so far." Complete steps 1-4 on the "Water Cycle in a Bag" worksheet.

6. After 6 minutes, go and get the bags! Ask students to pay close attention to what they see happening in the bag. Give them time to observe.

7. Tell them to go back to their desks and share with their partner. "What did you notice?"

Students will share whether they see fogginess, water droplets, etc.

8. "What stage of the water cycle can you see in your bag? Evaporation, condensation, or precipitation? Turn and talk!"

9. "Today we got to see condensation in our bags. In your bags you can see the tiny water droplets forming just like they do in the sky as clouds. Since our water was already hot, the evaporation started much quicker than it would have if we let the sun heat it up. But the same process still would have happened, it just would have taken longer with the sun. Our warm water just made it go much quicker. The only one that was more difficult to see in our bag was precipitation."

   "Turn your paper over and draw what you see, circle the stages of the water cycle you saw today, and label the diagram using what you know."

Demonstration of Knowledge:

- Complete "Water Cycle in a Bag" Worksheet
- Observe Water Cycle Bags

Wrap Up:

"Today we learned that water moves throughout Earth in a cycle. First, the sun heats water and turns it into a gas called water vapor, and it rises to the sky. This is called evaporation." Do the hand movements with the students.

"Then the water vapor turns back into a liquid and millions of water droplets make a cloud. This is called condensation." Do the hand movements with the students.

"Last, the water droplets fall out of the cloud as rain or snow. This is called precipitation." Do the hand movements with the students.

Extension Options (Additional Activities):

Music and Dancing:
Dance along to this GoNoodle water cycle brain break!
https://www.youtube.com/watch?v=KM-59ljA4Bs

Writing:
Write a narrative from the point of view of a water drop! Tell the story of a water drop going through the water cycle.

Reading:
Students can read and discuss attached ReadWorks articles.

Read Aloud:
Read The Snowflake: A Water Cycle Story.

Name: _____

Water Cycle in a Bag

Step 1: Draw and Write	Step 2: Fill	Step 3: Tape

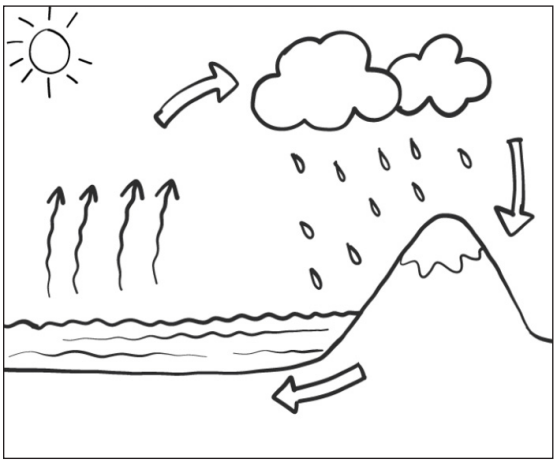
Step 4: What do you predict will happen in the bag?

_____

_____

_____

Draw what you see!	What stage of the water cycle do you see?
	Evaporation Condensation Precipitation



Water Takes Three Forms

by Rachelle Kreisman

Water comes in three forms: liquid, solid, and gas.

Water can be a liquid. It flows. It has no shape of its own. A liquid takes the shape of its container.

Water can be a solid. Solids have their own shape. Water in its solid form is called ice.

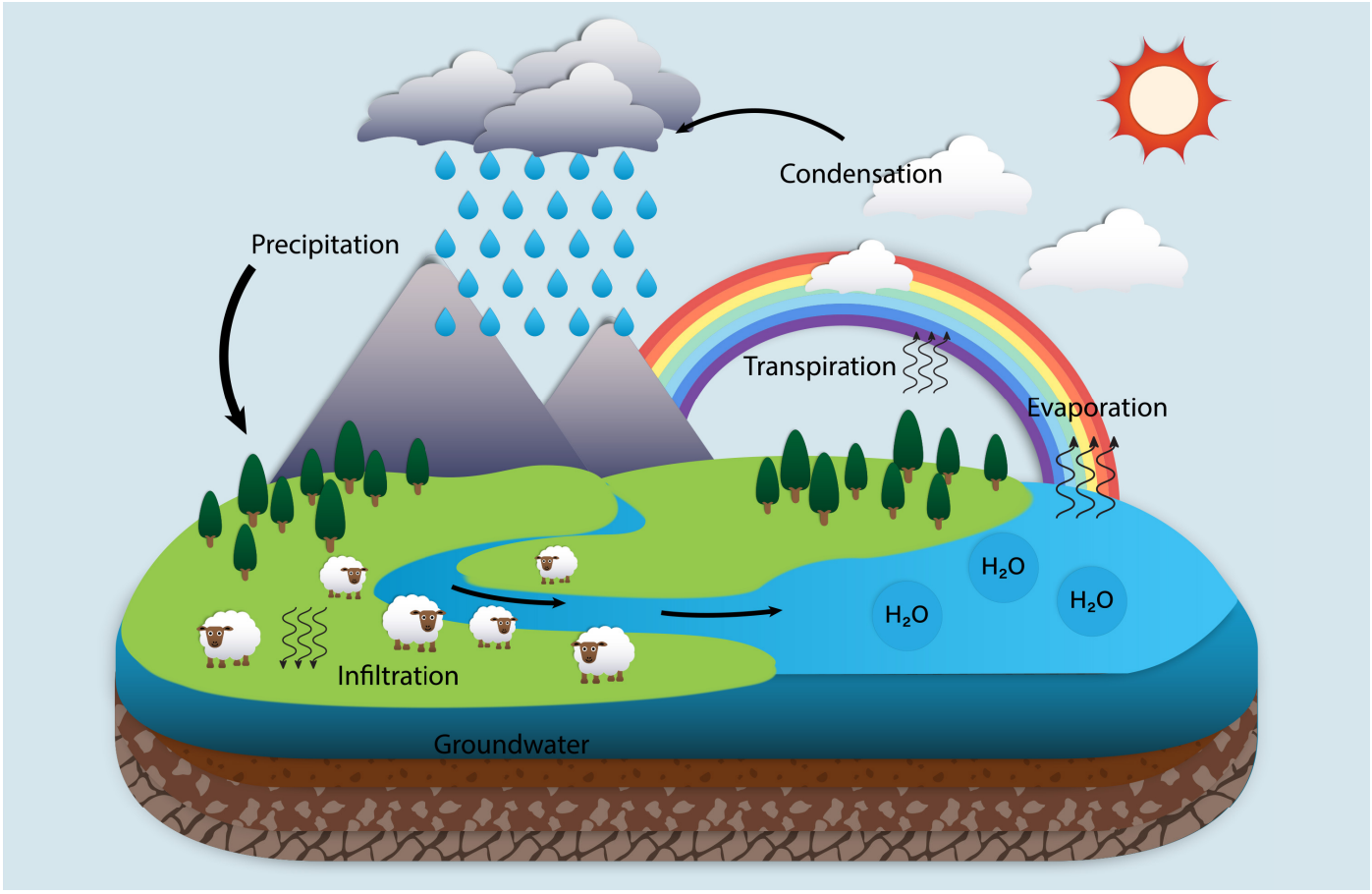
Water can be a gas. Gas has no shape. Water in its gas form is called vapor.

You can see liquid water after it changes to a solid. Pour water into a cup. Put the cup into the freezer. The next day, the water will have turned into ice.

Ice can change back to liquid water. Observe this: Take ice cubes from the freezer. Put a few of them on a plate. They will melt and turn into liquid water.

Heat can change liquid water to a gas. What happens when a pot of water boils? Bubbles begin to form. Then the water starts to evaporate. You can often see the gas escape as water vapor.

Water vapor also can turn back into a liquid. That happens when the vapor loses heat. The process of water vapor becoming liquid is called condensation.



We Need Water!

Every living thing needs water to live. People need clean, fresh water for drinking, washing, and having fun. How do you use water?

Watch the Water Cycle

Water is found nearly everywhere. It is in the ground we walk on and in the air we breathe. Water moves from land to sky and back again. That journey is called the water cycle. Did you ever wonder where that glass of water comes from? Take a look!

1. The sun warms the water in rivers, lakes, and oceans. Soon the warm water changes into a gas. That change is called evaporation. The gas floats up and forms clouds in the sky.

2. The gas in clouds cools. Soon the cool gas turns back into water. That change is called condensation.

3. Water falls from the clouds to Earth as raindrops or snowflakes. That process is called precipitation.

4. Rain soaks into the ground. The water flows back into the rivers, lakes, and oceans. That process is called collection. Soon the water cycle starts all over again.

Protect Water!

Here are some tips you can follow to protect Earth's water.

- Pick up trash and do not litter. Trash can let harmful poisons flow into the water.
- Don't waste water. Save water by turning off the faucet while brushing your teeth.

The Blue Planet
Lesson Plan

Grade Level: K-2

Objective:

1. Students will be able to understand that most of Earth's water is found in the oceans.
2. Students will use a map to determine that Earth's surface is mostly covered with water.
3. Students will recognize both liquid and solid bodies of water on a map.

NGSS Standard:

2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be solid or liquid.

Materials Needed:

1. Globe or picture of a world map
2. Chart paper or digital way to chart ideas
3. 4 plastic cups per partner group
4. Post-It notes
5. Red Solo plastic cups
6. Blue food coloring
7. Plastic spoons
8. Pipettes

Teacher Prep:

1. Globe or world map
2. Chart paper with "Where is water on Earth?" as the title
3. Each partner group needs one cup of blue water

Introduction:

- Hold up a globe or share a picture of a world map. Ask, "What do you notice?"
- Students might notice the different colors on the map/globe. If not, you can prompt with, "What do you notice about the colors?"
- "What do you think the blue color represents?" This should lead them to the idea that we have a lot of water on the Earth. "Earth is called the Blue Planet because it has so much water on it."
- "Where is water found on Earth?" Think out loud that you know that water is FOUND in oceans. Tell students to stay away from places where water isn't naturally found. For example, pool water is placed there by humans. Write oceans on your chart. Invite the students to turn and talk and share their ideas. Chart what your students say. Ex. lakes, rivers, glaciers, icebergs.

- If they don't know what a glacier is, use an online image to explain that a glacier is a large body of slowly moving ice. "It is a body of water in ice form!" "Water can exist in both liquid form as water and solid form as ice! Water can also be found underground. This is called groundwater. Groundwater is fresh water."
- Point out that all the water can be divided into fresh water or ocean water. "Lakes, glaciers, ponds, and rivers are examples of fresh water! Oceans are salt water." Circle these and label them as salt water and fresh water on your chart.

Activity:

"Today we are going to learn how much water on Earth is found in oceans, ice, groundwater and rivers or lakes. Groundwater is fresh water found underground!"

1. Give students 4 plastic cups.

2. Give each partner group a large red Solo cup of water with blue food coloring in it. "This red cup of water represents ALL of the water found on Earth."

3. "Your 4 plastic cups will represent ocean water, groundwater, ice, and rivers or lakes. Take 3 minutes now to label your cups with post it notes."

4. "How much of Earth's water do you think is found in oceans, groundwater, ice, and rivers or lakes? Your job today is to separate the water in your red cup into the 4 different cups based on how much water you think is found in each place. Turn and talk with your partner to make a plan. How much will you pour into each cup?" Give students 2 minutes to separate their water into each cup.

5. Turn and talk, "How did you separate the water found on Earth? Why?" Take a few students' answers.

6. Have the students do a gallery walk around the room to see what other partner groups did. Give them 2 minutes to walk around the room with their hands behind their backs to make observations of other student's thinking.

7. "What did you notice about how the other groups sorted their water? Did you see anything all the groups had in common?"

8. Watch this video: https://www.youtube.com/watch?v=wZK2xTNzgq8

9. Choose who will be partner 1 and 2.

10. "Partner 1, pour all the water back in the water cup."

11. "Partner 2, scoop out 2 spoons of water and put it in the ice cup."

12. "Partner 1, use the pipette to squeeze one drop of water into the rivers and lakes cup."

13. "Partner 2, Pour the rest of the water in the ocean cup."

14. "WOW! Most of our Earth's water is in the form of oceans. A very small amount is fresh water."

Demonstration of Knowledge:

- Pass out a worksheet for students to draw a visual of what they learned.
- Complete the coloring activity on the back.

Wrap Up:

"Today, we learned that water on Earth can be found in oceans, groundwater, ice, and lakes or rivers. Ocean water is salty. Ice, rivers, and lakes are examples of fresh water. As you can see on our globe, our planet has so much water and that is why Earth is known as the 'Blue Planet.'"

Extension Options:

Social Justice:

Do you think everyone should have access to clean water? Why or why not? In communities that don't have access to clean water, what are some solutions that you can think of to solve this problem?

Environmental Science:

Since freshwater available for use is so limited, conserving water is important. Discuss with students the different ways they can help conserve water. (Turning the water off when brushing teeth, taking shorter showers, reusing bathwater to water plants, etc.)

Kahoot:

Have students play this Kahoot to review the content learned in the lesson.
https://create.kahoot.it/details/1d1e5aef-08a5-4d83-b844-5b8827df5289

Reading:

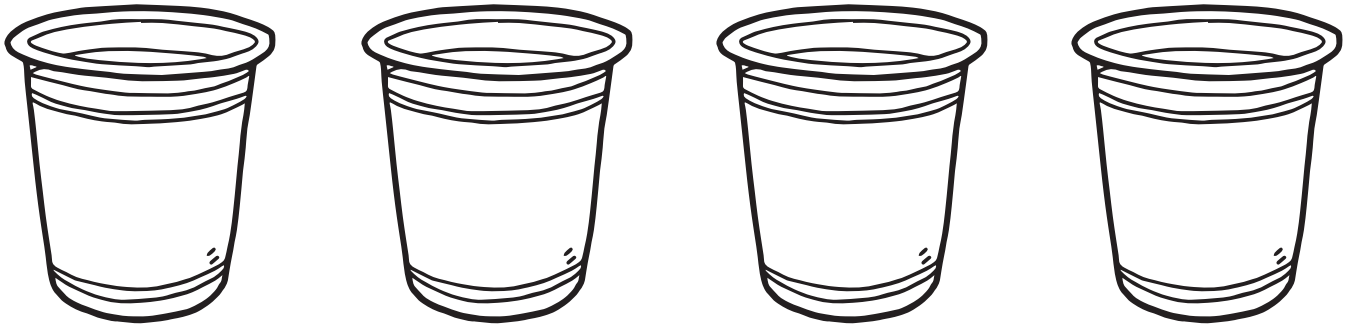
Students can read and discuss attached ReadWorks articles.

Name: _____

1. Label each cup using the word box.

2. Use a blue crayon to color in how much water is in each cup.

Ocean Water	Groundwater	Ice	Lakes and Rivers



_____ _____ _____ _____

Where is most of the water found on Earth? Where is the least amount of water found on Earth?

_____

_____

_____

💧	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Number chart of water on Earth

1. Color half the water droplet blue. This is the fresh water in rivers and lakes (less than 0.5%).
2. Color square 2 orange. This is the fresh water underground (less than 1%).
3. Color squares 3 and 4 yellow. This is the fresh water in ice (2%)
4. Color the rest of the squares green. This is the salt water in oceans and seas (96.5%).

How Does Water Affect Earth's Features? Lesson Plan

Grade Level: 3-5

Objective:

1. Students will understand that our Earth is shaped by water.
2. Students will analyze the impact that water had on their landform.
3. Students will compare structures before and after the impact of water.

NGSS Standard:

4-ESS2-1 Earth's Systems
Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Materials Needed:

- Aluminum pans (1 pan per 3-4 students)
- Sand
- Rulers (one per group)
- Masking tape
- Styrofoam cup (one per group)
- Styrofoam cup filled with water (one per group)

Teacher Prep:

1. Consider grouping students strategically in groups of 3-4 students.
2. Fill each pan about halfway with sand.
3. Ensure that you have water cups prepared and ready.

Key Vocabulary:

Weathering- when Earth's systems, like water, break down rock
Sediments- small pieces of rock
Erosion- when water or wind move sediments to other places
Hypothesis- making a prediction about what will happen in an experiment

Introduction:

- Show students the photos below

Discuss what they observe and complete a "See, Think, Wonder" organizer as a class, individually, or in partners.

See Think Wonder		
See What do you see?	**Think** What do you think is going on?	**Wonder** What does it make you wonder?

Activity:

1. As a class, brainstorm major features of the Earth (ex. mountains, valleys, volcanoes, rivers, beaches, etc.) and create a list on the board or chart paper.
2. Ask the essential question: "How does water affect the Earth's features?"
3. Instruct students to get into groups and gather their materials (One aluminum tray filled with sand, a ruler, tape, and a cup).
4. "With your group, create a landscape using at least two of the landforms from our brainstorm in your sand."
5. Give students 3-5 minutes to create, then another 3-5 minutes to draw a picture of their landscape in the "before" box.
6. "What do you think will happen when we add water to your landscapes? Make a hypothesis with your group and then write it on your papers."
7. Share out ideas as a class.
8. Have students tape their ruler to the aluminum pan so that it goes across the sides.
9. Instruct students to use their pencil to safely poke a hole through the bottom of the cup.
10. "Tape the cup to the ruler so that it sits above the sand, and that the hole in the bottom of the cup is not covered by the ruler."
11. "Ok students, now we are going to see how water impacts our landscapes. Pay attention to any changes in your landscapes! Pour the cup of water into the cup with the hole in it and observe changes."
12. Have students share out changes that they observed with other groups and note similarities and differences.
13. Have students draw a diagram of their landscapes in the "after" box.

Post Activity Discussion Questions:

- "What major changes do you notice in your landscapes before and after the impact of water?"
- "What do you think the water from our experiment is similar to in the real world?"
- "Do you think these changes happen quickly like in our experiment, or over a long period of time? Why?"

Demonstration of Knowledge:

- Answer the final question on the activity page, "Use information from your experiment to explain the impact of water on Earth's surface."

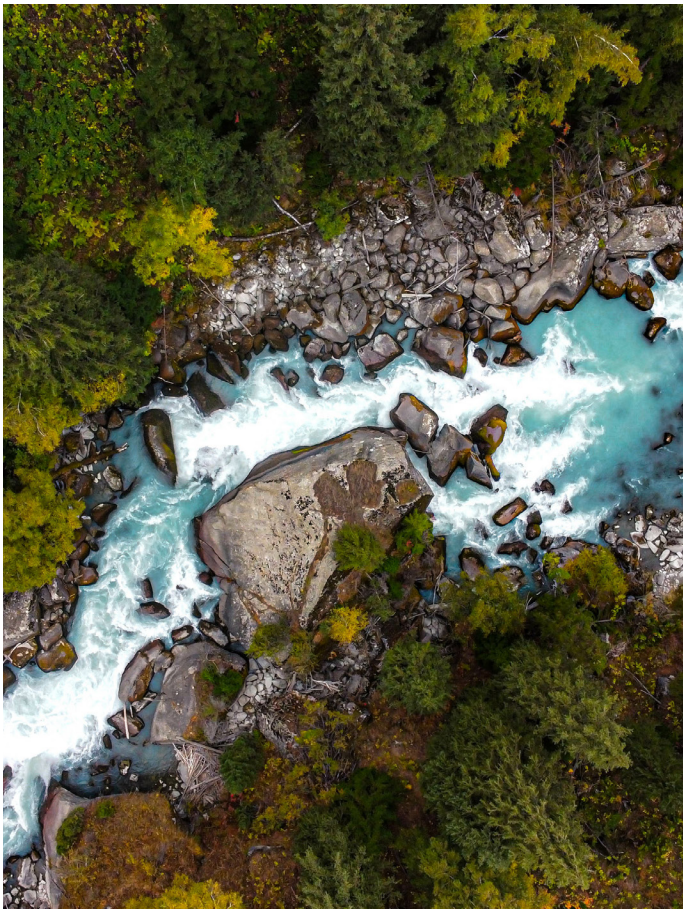
Extension Options:

Virtual Field Trip: Explore the Grand Canyon

- Watch this video (we recommend 2x speed, and feel free to skip around)
- Make observations about the landscape
- Note how water might have impacted the land

ReadWorks Article:

What Water Moves Sediments



Name:_____

Essential Question: How does water affect the Earth's surface?	
Our landscape before water:	Our landscape after water:

Observations:

_____

_____

_____

Show what you know!

Use information from your experiment to explain the impact of water on Earth's surface.

_____

_____

_____

When Water Moves Sediments

Erosion is any process or force that moves sediments to new locations. Wind and water both cause erosion. The tug of gravity pulls sediments out of wind and water. Flowing water picks up sediments and carries them downhill to new locations. A summer rain can wash fine sediments onto sidewalks and into gutters. A rushing mountain stream can sweep small stones into a valley. A flooded river can surge along with enough force to move large rocks many miles downstream.

As moving water slows, sediments sink to the bottom of the river or stream. The heaviest sediments are the first to be deposited. The finest sediments are the last. Layers of sediment accumulate at the mouths of rivers and on the bottoms of lakes. Vast layers of sediment are also deposited on the ocean floor over long periods of time. Like wind- deposited sediments, those laid down by water may someday be transformed into sedimentary rock.

Water doesn't have to be in its liquid state to erode sediments. Glaciers are enormous masses of ice found in polar regions and near the tops of tall mountains. Although ice is solid, glaciers do move. They flow-very, very slowly-downhill. As countless tons of ice creep over land or down mountainsides, they push, drag, and carry eroded sediments along. Moving glaciers also create sediments as they grind against rocks beside or below them. Glaciers are such powerful forces that they can carve huge U-shaped valleys through mountain ranges.

When glaciers melt, they deposit the sediments they have been carrying. About 20,000 years ago, glaciers covered large parts of North America, Europe, and Asia. As the climate warmed, the glaciers melted and retreated northward. They left behind massive deposits of sand, gravel, and silt, along with collections of rocks and boulders. You can still see these deposits as hills, mounds, and ridges on the landscape.

Can We Drink Water from Anywhere?
Lesson Plan

Grade Level: 3-5

Objectives:

1. Students will understand that a process called filtration cleans our water and makes it safe for drinking.
2. Students will demonstrate how filtration filters out unwanted items from our water.

NGSS Standard:

3-5-ETS1-3 Engineering Design Plan
and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Materials Needed:

1. Cotton balls or coffee filter
2. Plastic bottle (empty and clean) with bottom cut off
3. Clear drinking glass
4. Activated charcoal
5. Sand
6. Gardening dirt
7. Water

Key Vocabulary:

Filtration- the process of removing unwanted materials from something.

Teacher Prep:

1. Place all materials in easy-to-reach places. We suggest a buffet style setup that students can move through as they create their filter.
2. Make sure all students (or partner pairs) have a plastic bottle with the bottom cut off.
3. Prepare dirty water sample (can use glitter and oil for something fun and colorful or dirt and grass for something realistic).

Introduction:

- Place a glass of muddy/dirty water in front of the class: "Would you drink this water?"
- Students might give various silly answers, then ask: "What do you think would happen if you drank this water as it is right now?"
- Students might predict that their stomach would hurt, or it wouldn't be healthy for them.
- Place another cup with visibly clean water in front of students and pose the same question: "Would you drink this water?"
- "Is there something we could do to our dirty water to turn it into water that might be safe for us to drink?"
- Students might say a variety of things from yes absolutely to no way; brainstorm ideas as a class.

Activity:

1. "Today, we are going to experiment with a process called filtration. What word do you hear inside the word filtration? That's right, filter! Where have you seen a filter before?" Students might say things like the pool, their Brita, when they make pasta, etc.

2. "To filter something means to remove unwanted parts. When we use a process called filtration, we remove the unwanted material inside the dirty water to make it safe for our bodies to drink. Today, we are going to make our own water filters!"

3. Make sure all students (or partners) have one plastic water bottle with the bottom cut off and a clear drinking glass.

4. Either pass out materials or set them up buffet style and have students choose items to build their filters.
    - Cotton ball or coffee filter on the bottom (about 1-2 inches)
    - Activated charcoal next (about an inch)
    - Small gravel
    - Sand

5. Once students have their filters ready, place filters over the clear drinking glass.

6. Pour dirty water sample into the filter and make observations of what happens.

7. Ask discussion questions.

Wrap Up:

Show this video "When is Water Safe to Drink?"

Discussion Questions:

- "What did you observe?"
- "What happened to the dirty water as it traveled through the filter?"
- "What kinds of things do we need to filter out of our water to make it safe for drinking?"
- "What could we do to our design to make it more effective?"

Demonstration of Knowledge:

Draw and label a model of your filter and explain what is happening as the dirty water travels through the filter.

Name:_____

Essential Question: Can we drink water from anywhere?
Use the space below to draw and label a model of your water filter.

Show what you know!
Explain what happens as dirty water moves through the filter.

_____

_____

_____

_____

_____

Extension Options:

Research a Water Treatment Plant

1. Find a local water treatment plant and research their filtration process, reach out to a scientist there to share more about the process, or take a field trip to the plant.

Experiment With Different Materials

2. Use different materials in your water filter and track and observe changes to the water.

How Water Loss Affects Biodiversity

by ReadWorks

In order for humans to live, they need access to fresh water. While nearly 70% of the earth's surface is water, most of it is salt water, which humans cannot drink. Only a small percentage, about three percent, is fresh water. Of this, about 69% is currently frozen as ice caps and glaciers, while another 30% is held underground in the soil or in rock. This means that only one percent of the world's fresh water—or .03% of the world's total water—is surface water that humans can access to drink. The small amount of potable (suitable for drinking) water makes its conservation incredibly important so that water shortages already occurring in some regions do not spread any further. If they do spread, this may lead to conflicts over the right to use this water.

There are many ways in which humans can affect access to fresh water. For example, humans can pollute bodies of water, thereby making them undrinkable. In some cases, they may make physical changes to the land by building over wetlands or damming up rivers. While wealthy countries can afford to make the investments necessary to make sure their residents have access to fresh water, poorer countries often cannot. This means that poorer countries are at greater risk of devastating droughts, which can lead both to dehydration and starvation, as the country is unable to water its crops. Droughts can also have a negative impact on the biodiversity of a region. Biodiversity refers to an abundance of different types of plant and animal species within a particular region. The prefix "bio" means living, while "diversity" refers to different types of things. Around the world, more than 125,000 animal species live entirely in freshwater habitats, including 15,000 species of fish, 4,300 species of amphibians, and 5,000 species of mollusks, such as clams and oysters. Millions of other species, including humans, depend on fresh water to drink. When an area loses a large percentage of its fresh water, many animals die off. In some cases, species go entirely extinct. This leads to a decrease in the region's biodiversity.

While droughts are natural and, in many places, a frequent occurrence, there are many things that humans do to increase the severity of these droughts. For one thing, the world's population has doubled in the last 50 years, so humans have been using much more fresh water to drink and grow crops than they did in the past. Humanity's increasing water consumption represents a growing threat to biodiversity.

In Africa, where droughts are common, they have been more prolonged than in the past. This is due in part to climate change, as well as a greater demand for water as the continent's population has increased. During a drought in Kenya that lasted from 2007 to 2009, over 60 elephants died-some of dehydration, others of starvation due to lack of vegetation to eat, and others of diseases that became fatal due to the elephants' weakened states. Some other endangered animals, such as the white rhinoceros, died too, which brought them closer to extinction.

When the biodiversity of a region declines, the human population suffers as well, in different ways. When a region experiences a significant drought, many animals may die from lack of water and food. If the region is one like Kenya, which depends on its wildlife to draw tourists, the effects of the drought can be devastating. If tourism declines due to high wildlife casualties, then the locals who depend on income from tourism will lose their livelihood. People may then turn to farming to earn money, but crops require water to grow. This can place further strain on the water supply and worsen the original problem of the drought. Sometimes, an imbalance in the system, such as a lack of water, can enter into a feedback loop where the situation only gets worse and worse.

Losses in biodiversity can also lead to problems with the availability of food. As we've discussed, a lack of water can prevent farmers from growing crops, which can lead to starvation. However, when a region loses its biodiversity, it disrupts the food chain in many ways. For example, if a species goes extinct, all the species used to feeding on it must find another source of food. Say a particular species of freshwater frog dies because its habitat has been depleted in a drought. This means the population of birds that feeds on this frog may decline as well, as it lacks sufficient food. Conversely, the insects that the frogs fed on may increase in number, as the frogs are no longer around to keep their population in check.

One of the main advantages of biodiversity is that there are certain natural processes that plants and animals perform that humans simply cannot. The billions of bees in the world play a critical role in pollinating the world's flowers. If they did not do this, the food supply would dwindle and the human population would suffer greatly.

Biodiversity can play an important function in the cleaning of water. When water passes through lakes, wetlands, and streams, it often encounters different species of fungi, algae, and bacteria. Many of these microbes actually filter microscopic particles out of the water, making it safe for humans to drink. Even some larger species do similar work. For example, the caddisfly constructs nets underwater that filter out different kinds of particles, which it then eats. Wetlands rich with these filtering organisms act as natural water filtration systems. When the biodiversity of a region declines, many of the organisms critical to this filtering process can disappear. Therefore, pressures on the freshwater supply can cause biodiversity to decrease, which can cut the drinkable water supply even further.

While humans do have some water filtration plants, these plants are expensive and take a lot of energy to maintain. For centuries the water that flowed into New York City was naturally filtered by a northern watershed. As the water flowed south, it was purified. However, as the watershed was polluted and diverted, the water flowing to New York City was no longer filtered. The city faced a choice of spending $6 billion to $8 billion to build a water filtration plant, or just $1 billion to restore the natural watershed. The city wisely chose the latter option.

