



SPLASH!

**INSPIRE KIDS TO
BECOME WATER
CONSERVATION HEROES
BY USING THIS
AFTER-SCHOOL TOOLKIT
TO TEACH THEM ABOUT
OUR VITAL WATER
RESOURCES & THEIR
IMPORTANCE TO ALL
LIVING THINGS.**



**AFTER-SCHOOL
TOOLKIT**

SPONSORED BY



WATER WARRIORS

EDUCATIONAL ENRICHMENT PROGRAM



*This **Water Warriors educational enrichment program** invites children and those who teach them to learn about our vital water resources, the importance to all living things and to be conservation stewards. Water resource protection and availability is a global concern as more than half a billion people have no access to clean, safe drinking water. Increasingly, local water resources are facing pressure from a growing population and from issues related to climate change. Our goal at H2O for Life is to provide youth with rich and robust experiences that will guide them toward a life-long ethic of stewardship and civic engagement. These experiences can take place within the academic setting, but there is great potential in less formal settings such as the after school or camp programming environment.*

Take a dive and explore the wonders of water with your students! This guide provides the program leader with all the tools needed to engage children in fun enrichment experiences that teach foundational content surrounding water science and water issues.

H2O, A Marvelous Molecule

Learn about the incredible properties of the simple water molecule. Students become water molecules in a jar and do a few fun water challenges.

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Water Cycle Discovery Bottle

Watch the water cycle in action! Recycled plastic water bottles are turned into a contained model of the earth's water cycle.

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Wetland Adaptations

Plants and animals that live in wetlands, ponds and lakes have fascinating adaptations. Students will discover and explore these adaptations in a fun and simple puzzle game.

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The Power of Clean Water

Students will learn about the global water crisis & observe a demonstration of how P&G Purifier of Water™ can be used as a method for making contaminated water good to drink.

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Water Music

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This STEM engineering task has students explore how water filtration systems work as they dive into this creative teamwork challenge.

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Aqua Power

Moving water is one of the most powerful forces on Earth. It shapes land surfaces & powers hydroelectric plants. Students construct a simple water wheel to explore the power of water.

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Race 2 Reduce Relay

Test your water conservation skills in a fun relay race to save every last drop. This game will have students thinking about how water can be wasted and that every drop counts.

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Take Action to Protect Your Water Resources

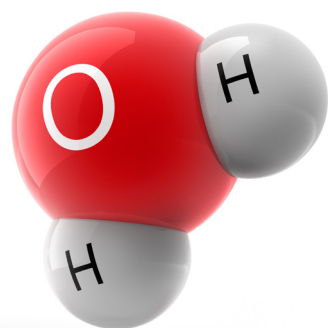
Every Water Warrior has the power to make a difference. Find a water resource problem or issue that can be improved through youth action.

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The Global Water Crisis

The global water crisis is real and we can all be a part of the solution. Students will learn about the critical need for clean drinking water around the world, and what they can do to help.

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H₂O, A MARVELOUS MOLECULE

Upon completion of this activity, students will have an understanding of the molecular structure of water and its properties.



Background

Water is such a simple molecule, and it's incredible properties are simply fascinating. This set of learning activities will guide even the youngest students through a series of discoveries as they build knowledge about the amazing water molecule.

Here are some resources that will give you some background knowledge:

USGS Water Science School

<https://water.usgs.gov/edu/>
Everything you would ever want to know and learn about water, along with a great collection of activity guides and lesson plans.

3 D Molecular Designs

3dmoleculardesigns.com

This company makes great 3 D models, but you don't have to buy the product to scan through their lesson plans that explain the basic chemistry and physics of water, including bonding, polarity, phase change, adhesion and cohesion.

Learning Target

Upon completion of this activity, students will have an understand-

ing of the molecular structure of water and its properties.

Essential Questions

- What is a molecule?
- What makes up a water molecule?
- What are the 3 phases of water and why do they happen at certain temperatures?

Bridge

Introduce the activity with a connection to prior knowledge... Ask students what H₂O stands for. Be sure to include a discussion about what a "molecule" is. Ask students what happens to water when it gets very hot or very cold. Tell them that this set of activities will help them understand the structure of water molecules, how and why solid, liquid and gas differ, and some other fascinating facts about water molecules. Do you know that water is actually "sticky stuff"??

Engage

Make it real, make it fun, help them build new knowledge...

- "Water in a Jar" - students become water molecules in a simulated jar as they learn

about molecular kinetic energy and phase change.

- Mark off a large square on the ground or floor of a gym, classroom, hallway, leaving one side open. This represents a jar.
- Ask molecules (students) to get into the jar and stand very close together at the bottom of the jar. "You are now frozen solid."
- "Here comes the sun." Asks students to begin to sway a little as they gain energy from the sun. "you're melting and becoming a liquid."
- "Now you're getting warmer, and as you get warmer you move more." Ask students to start very slowly, randomly walking around, staying in the lines because they are now water in a jar.
- "Wow it's getting really hot out here!" Ask students to begin to move about a bit faster; some will necessarily begin to escape the jar at the top opening. This represents water in the vapor state.
- "Now you are all a gas, zipping around faster and faster as you rise out of the jar into the atmosphere."

Asks students what they observed:

1. What happened to the movement and speed of molecules as they absorb energy from the sun?
2. What happened to the space between molecules because of this energy and movement?
3. How does that relate to the states of solid, liquid and gas?

Build

Next, have students build a simple water molecule from marsh-



mallows and toothpicks.

Challenge students to "float" a paperclip on the surface of a cup of water to demonstrate surface tension.

You can also challenge students to predict how many drops of



water they can place on a penny before it spills over (demonstrating water molecules' ability to stick to each other - cohesion, and stick to other surfaces - adhesion), then test their guess. It is surprisingly far more than they think.

Enrich

Ideas for additional investigation and extension... See the USGS website listed above for further water investigations. Project WET is also a great resource.

Reflect

What did you learn? What was surprising, fun, curious, What new question(s) do you now have?

Time Needed

20-30 minutes

Materials List

1. Masking tape, to mark off "jar" area
2. Marshmallows
3. Toothpicks
4. Pennies
5. Eye droppers
6. Cups
7. Water
8. Paperclips



WATER CYCLE DISCOVERY BOTTLE

Upon completion of this activity, students will gain an understanding of how the sun provides the energy for the phase changes of the water cycle.

► Time Needed

60 minutes

► Materials List

1. Recycled clear plastic water bottle with cap
2. Water
3. Blue food coloring
4. Sharpie marker

Background

What is the water cycle and how does it work? All the water that has ever existed on Earth is still here and gets cycled and recycled infinitely as it changes from gas to liquid to solid and back again. The sun's energy heats up water on the surface, in lakes, rivers and oceans, and causes evaporation. When this vapor hits cooler air it changes back to its liquid form and creates clouds. This part of the water cycle is called condensation. When so much of water vapor has condensed that the droplets become large and heavy, the liquid falls back down in the form of precipitation. When the water falls back down it may collect in different bodies of water like rivers, streams, lakes or oceans. Or it may sink into the ground to feed plants, get stored in an aquifer, or it may runoff into nearby bodies of water if the ground is already saturated. Eventually the water evaporates which is all part of the water cycle and at another point it will fall back down to the ground. In the water cycle discovery bottle you can not see each stage completely, but it is a great hands-on project to go along

with talking about the water cycle with your kids. It's a simple way to provide a visual for kids to see the changes.

Here is a great resource for more information and activities about the water cycle:

USGS Water Science School

<https://goo.gl/917sae>

Learning Target

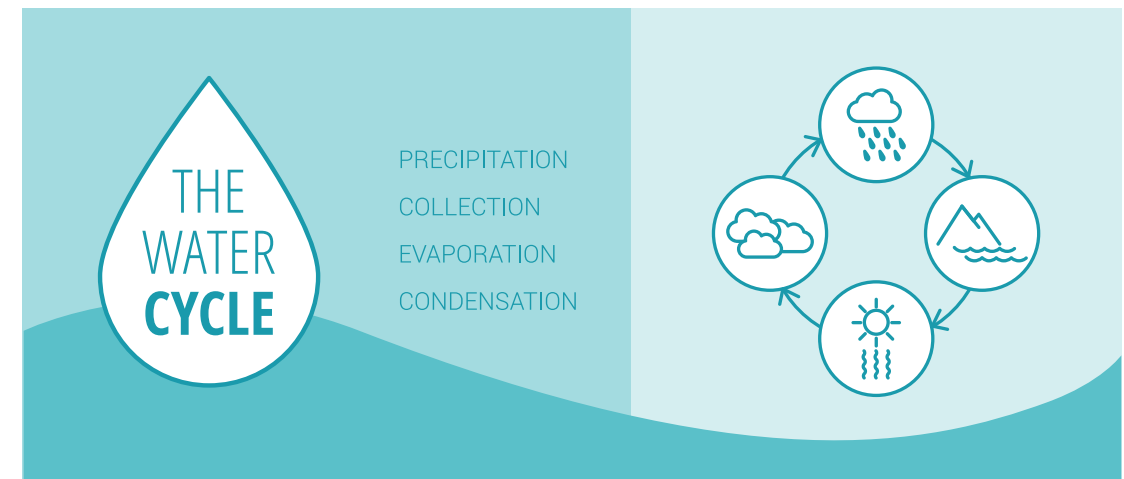
Upon completion of this activity, students will gain an understanding of how the sun provides the energy for the phase changes of the water cycle.

Essential Questions

- What are the 3 stages of the water cycle?
- Why is the sun's energy important to the water cycle?

Bridge

Introduce the activity with a connection to prior knowledge... Begin by asking your students if they know of anything that "cycles" ? They might think of recycling, when an object can be used over and over again, such as a plastic bottle that can be



melted, re-molded and reused infinitely. Another great example would be the cycle of the seasons. Then ask if they are familiar with the water cycle. Most students have been exposed to this concept by mid- to late-elementary years. Review the stages of the water cycle before introducing the construction of their discovery bottles.



Engage

Make it real, make it fun, help them build new knowledge...

First, have students draw a few elements of the water cycle on

their bottles - clouds, rain drops, the sun, a lake or puddle, land. Then add about ¼ cup of water and a drop of food coloring. Seal the bottles and place them in a sunny location. Such as a window sill or perhaps outside if it is a warm season.

After about 30-60 minutes, have students observe any changes that have happened inside their bottles and discuss how these findings relate to the water cycle.

Enrich

Ideas for additional investigation and extension...

Make a water cycle bracelet to represent the steps or pathways of the water cycle. Use different colored beads to represent Sun, Evaporation (water vapor), Condensation (clouds), Precipitation (rain), Surface Water (lakes and ponds), Ground Water (water in the earth's aquifers and soils), Plants and Animals.

Reflect

What did you learn? What was surprising, fun, curious, What new question(s) do you now have?

WETLANDS ADAPTATIONS

Upon completion of this activity, students will understand the concept of adaptation and will have a greater understanding of the specific adaptations for a number of wetland plants and animals.



► Time Needed

20-30 minutes

► Materials List

1. Pictures of a familiar animal and plant for the bridge discussion
2. Pictures of wetlands animals and plants, preferably printed on card-stock, and cut into puzzle pieces (the younger the learners, the fewer the pieces)
3. Envelopes to put the individual puzzle sets in

Background

In addition to having a niche, or address, every living thing in a wetland habitat has special adaptations that ensure their survival in that habitat. Fish have gills to obtain oxygen directly from water, plants might trap air in their leaves enabling them to float at the surface and capture sunlight.

Here are some resources:

- **Wild Tracks - Freshwater Ecosystems:** goo.gl/KBVxYL
- **Kids Do Ecology:** goo.gl/yexwvt

Learning Target

Upon completion of this activity, students will...
Understand the concept of adaptation and will have a greater understanding of the specific adaptations for a number of wetland plants and animals.

Essential Questions

- What is an adaptation?
- How do wetland adaptations help plants & animals survive?

Bridge

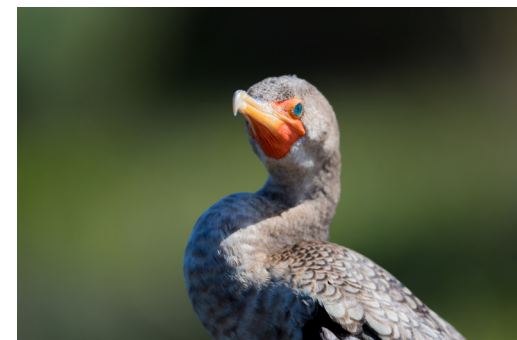
Introduce the activity with a con-

nection to prior knowledge... Begin by discussing what is an adaptation. Use a familiar example of an animal that has easily identifiable adaptations. Perhaps a squirrel or a hawk.

Show students a photo of a wetland animal and lead a discussion of its special adaptations for survival in the aquatic environment. Repeat with a wetland plant.

Engage

Make it real, make it fun, help them build new knowledge... Next, play the puzzle game. Each group of 2-4 students gets an envelope with 4 or more puzzle pieces. Students are instructed to take only one piece out at a time and try to guess what wetland animal or plant it is. If they can't guess, they can take another



puzzle piece out and try to guess again. If students have math skills, they can keep score:

- 1 guess = 4 pts.
- 2 guesses = 3 pts.
- 3 guesses = 2 pts.
- 4 guesses = 1 pt.

Once they have put their puzzle together, they will then write down 4 adaptations the organism has for wetland life.

Conclude by asking each group to share their wetland plant or animals and its adaptations.

Repeat with other sets as time allows.

Enrich

Ideas for additional investigation and extension...

Allow students to make their own puzzle cards. If computers and a

printer are available, let them do a search to find an image of local plant or animal, research one or two of its unique adaptations, print it out and cut up the image to make their own puzzle cards.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?



THE POWER OF CLEAN WATER

Upon completion of this activity, students will learn about the global water crisis, learn about and observe a demonstration of how P&G Purifier of Water can be used as a method for making contaminated water good to drink.

Background

Water is essential for life, which means all living things must have water to survive. Even though 70% of the earth's surface is covered by water, only one percent of it is available for human uses such as drinking, bathing, cooking and cleaning. The water we use comes from rivers, lakes or from wells under the ground. Many dangerous germs and chemicals are removed from water before we drink it to prevent it from making us sick, but not everyone has access to clean drinking water. Sadly, nearly 1000 kids still die every day due to illnesses caused by unsafe drinking water.

The non-profit P&G Children's Safe Drinking Water Program (CSDW) provides clean drinking water to people in developing countries using water purification packets P&G scientists invented. P&G is the maker of many of the household brands you know like Tide®, Crest® and Dawn®. Since 2004, the CSDW Program has provided over 13 billion liters of clean drinking water to families to improve health and help save lives.

The science behind the Purifier of Water packets was developed through a collaboration between P&G scientists and experts at the Centers for Disease Control and Prevention (CDC). The powder mixture uses coagulants and flocculation to pull dirt and contaminants out of the water and a disinfectant kills bacteria and viruses, making the water clean and drinkable.

For a more in-depth learning experience that focuses on the power of clean water, check out the full set of lesson plans available on the H2O for Life website:

<https://goo.gl/wWMj2W>

Essential Questions

- Why must water be cleaned before we drink it?
- Where in the world are drinking water issues critical?
- How does the P&G Purifier of Water product work?
- How can this solution help address the global water crisis?

Bridge

Introduce the activity with a connection to prior knowledge...



Visit <https://goo.gl/forms/yZMDZVTpxss2Hy5m1> to order 4 free packets to use in your classroom.

Begin by asking your students the following questions to get a discussion started:

- What do you use water for in your daily life?
- Why is water important?
- Where does your water come from?
- Why must water be clean before we drink it?
- What are bacteria and viruses?
- What is a disinfectant?
- What things can happen to cause water to be contaminated?

Engage

Make it Real, make it fun, help them build new knowledge...

Prepare 2.5 gallons of dirty water. Have your students make observations about the water and ask if they would ever drink water that appeared like this sample. Add one packet of the P&G Purifier of Water compound and have students volunteer to vigorously stir with a long handled spoon for 5 minutes. Next, allow the water to settle for an additional 5 minutes. Students should observe that

the dissolved solids in the water have now coagulated and flocculated, leaving clear water. Cover a smaller container, perhaps 1 quart in size, with a paper towel or cotton cloth. Pour some of the clean water from the bucket into the smaller container, through the filter material. Now let the water stand for an additional 20 minutes while the disinfectants work to kill any bacteria or virus particles. During this time, you may wish to have your students visit the P&G Children's Safe Drinking Water website to learn more about the global water crisis and watch some engaging videos. <https://csdw.org>

If you choose to, the purified water is now clean enough to drink and can be sampled. Discard the sediment from the water treatment process in the toilet or on the ground away from children and animals.

Enrich

H2O for Life has many engaging lessons plans and activity ideas that aid in knowledge acquisition about local and global water resource issues. Explore our lesson plans for ideas:

<https://goo.gl/PGY1Ki>

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?



Time Needed

30-40 minutes

Materials List

1. Two large containers that hold about 2.5 gallons (10 liters) of water each (we recommend that one be a clear container so that you can see the transformation process as it happens)
2. Spoon with long handle
3. Scissors
4. 2.5 gallons (10 liters) of dirty water*
5. Cotton cloth (a clean t-shirt can work well) or paper towels
6. 1 P&G Purifier of Water packet

*To make dirty water: Use approximately ¼ cup of dry, finely ground dirt which you can get from your backyard, and mix it with a very small amount of water to make a muddy paste. Then add water to fill the container up to 2.5 gallons



MAPPING A HABITAT

Upon completion of this activity, students will understand the concept of niche and gain some familiarity with common plants and animals found in a wetland habitat. Additionally, students will be learning mapping skills.

► Time Needed

30 minutes

► Materials List

1. Trading Cards
<https://goo.gl/zXJjA3>
2. Map for plotting niche locations Wetland Map
<https://goo.gl/dy5dfX>
3. Colored pencils or crayons

Background

Every plant and animal has its niche, or address, in its habitat. Using a fun set of trading cards, students will learn where common plants and animals can be found in wetland habitats, and some fascinating facts about them, as they trade cards and build a map.

Here are some great resources to learn more about wetland and aquatic habitats, or check out resources provided by your state department of environmental protection or cooperative extension service:

National Park Service Fish and Aquatic Species Website:

<https://goo.gl/GpVj5M>

Learning Target

Upon completion of this activity, students will understand the concept of niche and gain some familiarity with common plants and animals found in a wetland habitat. Additionally, students will be learning mapping skills.

Essential Questions

- What is niche?
- How do the adaptations of

plants and animals relate to their niche in a habitat?

- How can I use symbols and mapping skills to communicate my knowledge?

Bridge

Introduce the activity with a connection to prior knowledge...

First, ask students how they might describe the “address” of a common animal or plant, perhaps a frog or a dandelion. Explain that this address, along with how the living thing interacts with other living things, is called its niche. Every living thing has a niche in its habitat. Next, introduce the idea of mapping with symbols. On maps of their school, symbols are often used to designate where the classrooms, office, bathrooms, cafeteria and nurse are located. We will be adding symbols to a map of a wetland habitat to indicate the address or niche of a variety of plants and animals that are adapted to live in or near wetlands, ponds and lakes. For instance, a yellow circle might represent the location of black eyed susans and a green triangle might represent a species of frog.



Engage

Make it real, make it fun, help them build new knowledge... Distribute one map to each student (or pairs of students if you want to add some teamwork to this activity) and deal the cards (one or two per student, depending on the size of your group). Ask students to carefully read their card for information about where this plant or animal’s “ad-

dress” might be located on their map. Then ask them to create a symbol to represent their wildflower or critter, which could be a unique color shape or a simple sketch of the plant (or any other symbol they can creatively come up with) and add it to their map. Let’s make a game of this! Let’s see how many different species you can add to your map as you trade with your classmates.

Enrich

Ideas for additional investigation and extension...

Have students research what animal species are herbivores, carnivores or omnivores. Who eats who or what? Then have them create a food web on their map by drawing lines between predators and prey, or between herbivores and their plant forage. If you have access to an outdoor area, challenge your students to create their own map of an accessible habitat that they can observe first hand and identify as many different plants and animals in that habitat, adding them to their map with symbols.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?





WATER MUSIC

Upon completion of this activity, students will gain an understanding of how the sun provides the energy for the phase changes of the water cycle.

► Time Needed

30-40 minutes

► Materials List

1. Cardboard tubes from paper towels, gift wrap, mailing tubes
2. Tool to punch holes such as an awl or large nail
3. Flat head nails, slightly shorter than the diameter of the tube (1" tube uses 1/4" or 1/2" nail)
4. Masking or Duct Tape (comes in lots of great colors and patterns!)
5. Filling: seeds, rice, pebbles, beans, shells, beads, etc.
6. Materials to decorate the outside or the tube: stickers, ribbons, yarn, feathers, jewels, glitter
7. Actual Rainstick and other types of rattles, for demonstration (optional)

Background

The rainstick is a type of tubular rattle that produces a sound like a rain storm. Throughout time, the rainstick has been used by diverse cultures for a variety of purposes, including ceremonies, traditional music and children's toys. Rainsticks are made from naturally occurring hollow tubes, such as dried out bamboo or cacti. An internal matrix is produced by inserting wooden pegs, palm slivers or cactus spines. When pebbles, grains or seeds are added and the tube is sealed, the falling contents makes the sound of rain as it bounces through the matrix. Here are some additional resources to learn more about rainsticks:

- **Climate Kids** goo.gl/8jZnRV
- **Native Village** goo.gl/Vaun5M
- **Rainstick History** goo.gl/134vDg

Learning Target

Upon completion of this activity, students will recognize how other cultures create rainsticks from materials found in their environment; relate the sound produced

by an instrument to the type and quantity of materials used in its construction.

Essential Questions

- What is a rainstick and what was its purpose in ancient cultures?
- How is a rainstick constructed?
- What factors affect the sound a rainstick makes?

Bridge

Introduce the activity with a connection to prior knowledge... Introduce the activity by asking students to listen as you rhythmically shake a simple rattle, maraca, tambourine, etc. Ask your students what these instruments are used for. Probable answers might be to create music, used in ceremonies. Next demonstrate the rainstick and ask them what the sound reminds them of...the rain! Describe what the rainstick is, its history, how it is constructed and what purposes is served in other cultures it serves.

Engage

Make it real, make it fun, help them build new knowledge...



Demonstrate how students will construct their own version of a rainstick.

It is best to prep the tubes by punching about 12-18 holes in each tube with an awl or nail. Then students can more safely push their nails into the holes. Next, wrap the tube in masking or duct tape and seal one-end using a paper or cardboard disc with more tape over it. Add about 1/4-1/2 cup of filling (let students experiment with the amount of filling to get the quality of sound they like best, before permanently sealing the tube). Seal the tube. Students can then decorate and personalize their rainstick. Gently turn the rainstick and listen for the sound of the rain.

Enrich

Ideas for additional investigation and extension... Give each student two tubes and challenge them to make them each sound different by testing variables. Or have a team build a triple-length rainstick by connecting their tubes together.

Reflect

What did you learn? What was surprising, fun, curious? What

new question(s) do you now have?





ANCIENT WATER SYMBOLS

Upon completion of this activity, students will have an understanding of symbols used in ancient cultures to depict their relationship to and importance of water.

► Time Needed

30-40 minutes

► Materials List

1. Several example pictures of water symbols, both ancient and modern (see appendix to download pdfs)
2. Paper and pencils
3. Acrylic paints, brushes
4. Paper plates or other paint pallets
5. Stones to paint (flat ones work best, 3-6" wide)

Background

Many archaeological and historic sites through the world contain ancient rock paintings and carvings that depict or symbolize water. Some examples are the Native Americans of the south-west, such as the Anasazi, and the Aborigines of Australia. A pictograph communicates through pictures on stone that are carved or painted. In general, archaeologists believe that images created by early peoples represent information about harvests, location of herds or animals, social hierarchies, etc. and that several images represent water. This suggests that water was highly valued.

Read more about symbols in rock art:

National Park Service: goo.gl/4FLfhW

Waterglyphs waterglyphs.org

Learning Target

Upon completion of this activity, students will...

Have an understanding of symbols used in ancient cultures to depict their relationship to and the importance of water.

Essential Questions

- Why were symbols of water painted on or carved into rock by many different ancient cultures?
- What if I could create a water symbol, what would it look like?

Bridge

Introduce the activity with a connection to prior knowledge... Ask students to think of things or actions that are represented by symbols (e.g stop sign, handicap, no swimming). Next show them a picture of a water drop and ask them what it represents. Now show them the pictures of water symbols in ancient cultures. Discuss how the petroglyphs and pictographs were done and why those cultures chose to communicate to others about water.

Engage

Make it Real, Make it Fun, Help them build new knowledge...

Tell your students that now it is their turn! Create your own symbol for water, keeping in



mind how you want to represent the importance water has in your own life. Take 5 minutes to sketch your idea on paper, then recreate your symbol in paint on your rock.

Enrich

Ideas for additional investigation and extension...

With advance preparation, plaster of paris blocks can be made ahead of time and students can etch or carve their design into the surface.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now

have?

CLEAN IT UP

Upon completion of this activity, students will have explored an engineering task to solve a problem, and will have gained an understanding of the challenges faced by people who do not have access to clean drinking water.

Background

Many people in developing countries lack access to safe drinking water. Often, the only stage available to them is the filtration stage, in which they filter large particles out of the water using a cloth. However, for the water to be safe to drink additional stages of the treatment process are needed, especially the disinfection stage. This activity will focus on the filtration stage. Your students will become engineers and design a better filter for the citizens in developing countries. Students will construct a filter, test it, and evaluate how effective it could be for supplying clean drinking water. Here are some additional resources:

Teach Engineering - Water Filtration <https://goo.gl/vGxzXV>

EPA: Water Activities for Kids <https://goo.gl/mUQov9>

Learning Target

Upon completion of this activity, students will have explored an engineering task to solve a problem, and will have gained an understanding of the challenges

faced by people who do not have access to clean drinking water.

Essential Questions

What materials are useful in filtering water, and how can a water filter be improved?

Bridge

Introduce the activity with a connection to prior knowledge... Ask students where they believe their water comes from. What does a filter do and what kinds of things can be considered "filters"? Explain that even our water needs to be filtered and sanitized before we can safely drink it, but imagine what it must be like for people that have very contaminated water and must filter it and clean it themselves. Fill a beaker or clear cup half full with water. Then add contaminants: food coloring represents chemical contamination, beans represent human and animal waste, potting soil represents earth, baking soda represents road salt and torn paper presents litter. Explain that this represents the contaminated water that millions of people must rely on to survive.



might possibly improve the filtering capability of their design. Or ask them to think of a different set up other than funnel and cup, which basically simulates a filtration column system.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?



Engage

Make it real, make it fun, help them build new knowledge... Put students into teams of 2 to 4. Each team should be given a filtering set up (cup and funnel or repurposed water bottle) and a set of filtration materials, as well as a contaminated water sample which will be used to test their filter when they complete the design challenge. Explain to your students that they are scientists and engineers and they have been hired to design the best

filter system they can with the materials they have been supplied. They can construct their filter any way they choose. Once they have completed their design it will be tested using a contaminated water sample. The best design will be the one that produces the most clear, clean water sample!

Enrich

Ideas for additional investigation and extension... Ask your students to brainstorm or research other materials that



► Time Needed

60 minutes

► Materials List

1. Water
2. Contaminants for dirty water sample:
 - Liquid food coloring
 - Soil
3. Beans
4. Baking soda
5. Filtering Materials
6. Basket style coffee filter
7. Shredded paper
8. Cotton balls or scrap fabric
9. Sand
10. Sponges
11. Gravel
12. Plastic cups
13. Plastic funnels or plastic water bottles



AQUA POWER

Upon completion of this activity, students will have used experimentation to discover the mechanics of a water wheel.

Background

STEM learning experiences aren't just for the science classroom. There are many activities related to water that can be easily organized in the after school setting that provide experiential learning in the world of engineering. Water wheels are some of the earliest machines designed to harness the power of water to accomplish tasks. This activity gets kids building, thinking and experimenting. Here are a few good resources:

Teach Engineering : Water Wheel Lesson Plan <https://goo.gl/bgKhcS>

Green Kids Water Wheel Project <https://goo.gl/BGZkVt>

Cup and Plate Water Wheel <https://goo.gl/sxT8r8>

Make it Snappy Water Wheel <https://goo.gl/pDmPEL>

Learning Target

Upon completion of this activity, students will have used experimentation to discover the mechanics of a water wheel.

Essential Questions

- How does a water wheel work?
- What kinds of tasks can a water wheel do?
- What water wheel designs are most efficient?

Bridge

Introduce the activity with a connection to prior knowledge...

Ask students to think about how water can push things, change the shape of things. Likely responses include the action of waves, the force of a hose, erosion by rivers and streams. Explain that those are all examples of the force that moving water can exert on objects. Show pictures of water wheels. Discuss the kinds of work that water wheels do for people, such as grinding flour by turning large stones and generating electricity by turning magnetic turbines.

Engage

Make it real, make it fun, help them build new knowledge...

In groups of 2 or 3, students will then make their own version of

a water wheel. If working with young learners, show the demonstration wheel already constructed that they can copy. If older learners, show them the materials they can use to construct a water wheel and let them create the design. Test their final designs over a large plastic tote or bucket outdoors where water mess can be minimized.

Enrich

Ideas for additional investigation and extension...

Set up a competition to see how strong their water wheels are, by attaching a string and an object to the axle. Which water wheel can lift the heaviest object? Have student experiment with one design but different sizes to make observations about mechanical advantage. Change other variables, such as number of or angle of "paddles", cups vs. spoons as "paddles".

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you have?



► Time Needed

40 minutes

► Materials List

1. Foam plates
2. Plastic cups and spoons
3. Recycled 2 liter soda bottles
4. Aluminum pie plates
5. Dowels or skewers to serve as axles
6. Masking or duct tape
7. String
8. Large plastic bin or tub for testing
9. Pitcher



RACE 2 REDUCE RELAY

Upon completion of this activity, students will know ways to reduce personal water use.

Background

Test your water conservation skills and knowledge in a Race 2 Reduce relay, a game that will have your students thinking about every drop of water we waste.

Learning Target

Upon completion of this activity, students will know ways to reduce personal water use.

Essential Questions

- How does water get wasted in our day to day life?
- What can I personally do to reduce the amount of water I use daily?

Bridge

Introduce the activity with a connection to prior knowledge...

Engage

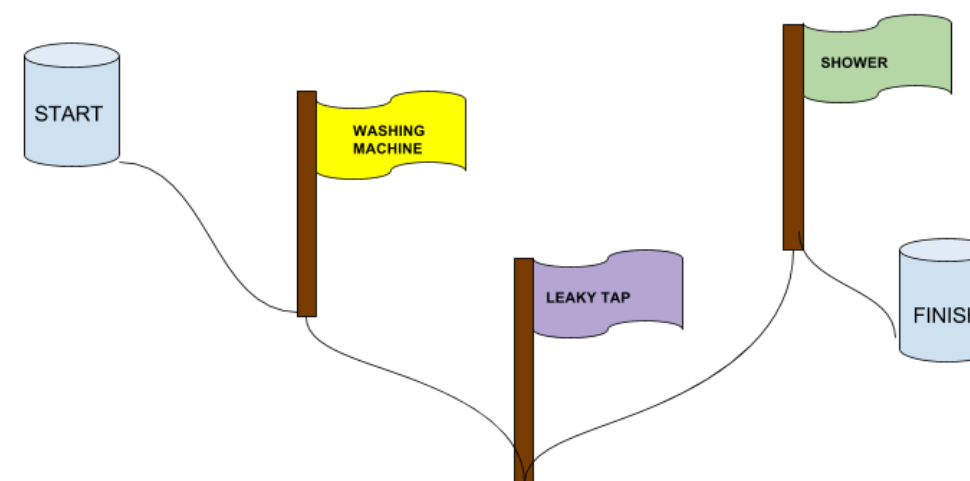
Make it real, make it fun, help them build new knowledge... Place the buckets of water beside each other making sure they have the same amount of water in them. Place the empty buckets at the other end of the playing field. Evenly space the 3 markers between the two buckets and attach one of the signs to each of these

stations. The cups with the holes should be placed at the station marked "Shower" and the cups without the holes go inside the buckets of water at the start line.

Team members will go through each station one at a time, doing each activity the number of times they rolled on the dice. Once the player gets to the empty bucket, he/she will dump their water into the bucket and hurry back to hand the cup to the next person. The object of the game is to get as much water as possible to the empty bucket.

Form two teams and line them up behind the buckets. Have each player roll the dice and remember their number (or have them draw numbers 1 through 6 out of a hat) as this is how many times they will do each activity at each station. Be sure to tell all racers that they may NOT put their hand over the top of the cup to stop water from spilling out.

Washing Machine: At this station, racers will spin in a circle like a washing machine. The higher number you have, the more laundry you do, so the more you spin!



Shower: At this station, dump the water from your cup into the cup with the holes in it, then catch the water back in your original cup. Every pour represents a 10 minute shower. So the higher your number, the longer you are showering.

Leaky Tap: Hop on one foot for every 100 drops of water that gets wasted down the drain. So if you rolled a 6, you hop up and down 6 times, representing 600 drops of water wasted.

The game ends when all racers have completed a trip through the course. The winning team is the team with the most water

in their finish line bucket, since they conserved the most water! Which team had the lowest numbers? Did they conserve the most water, too? Brainstorm some other ideas for saving every drop!

Don't forget to use the water from the game for good purpose, such as watering a garden.

Enrich

Ideas for additional investigation and extension... Challenge your students to come up with some other fun stations to add to the game! Maybe something that would represent brushing teeth, or watering a

lawn, or washing a car.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?

► Time Needed

20-30 minutes

► Materials List

1. 4 buckets, 2 filled with water and 2 empty
2. 3 Markers, flags or cones
3. 3 signs that read "Washing Machine", "Shower", and "Leaky Tap"
4. Dice
5. 2 cups
6. 2 cups with small holes in the bottom
7. Outdoor space to play



TAKE ACTION TO PROTECT WATER

Upon completion of this activity, students will know that their actions can have a positive impact on their school, community, families and themselves.

► Time Needed

Variable, usually several sessions

► Materials List

1. Variable, to be determined by the project students agree upon

Background

Taking a hands-on experiential approach to structuring activities for students can be taken a step further into the realm of service-learning by engagement in real world problem solving and taking action. Service-learning provides students with opportunities to develop civic engagement skills. Students can enhance their group, organizational, interpersonal and leadership skills. Here are some great resources on how to structure a service learning project with your students.

- **K-12 Service Learning Project Planning Toolkit** <https://goo.gl/bD9713>
- **National Youth Leadership Council** www.nylc.org
- **Character.org** <https://goo.gl/ueUk3f>

Learning Target

Upon completion of this activity, students will know that their actions can have a positive impact on their school, community, families and themselves.

Essential Questions

- What are some of the water resource issues that affect my [school, home, community]?
- Can actions bring about change?
- How can we get others involved in our action to solve this problem?

Bridge

Introduce the activity with a connection to prior knowledge... Start with a brainstorming session with your students. Propose a hypothetical problem that needs solving, then ask them for ideas of how to go about solving it. This should bring up things like...

- *We need to get more information about the problem.*
- *We might need to talk to experts.*
- *Maybe we need to think of solutions and take a vote to pick one.*
- *We might need volunteers to help.*

Engage

Make it real, make it fun, help them build new knowledge... Service Learning projects typical-



Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?

ly follow these steps:

1. Identify a problem
2. Investigate the problem and solutions
3. Plan and Prepare
4. Take Action
5. Demonstrate Results and Celebrate

Download the **H2O for Life Service Learning Toolkit** at <https://goo.gl/Qnb5Ws>

You and your students can use this guide to organize your proj-

ect and track your progress.

Enrich

Ideas for additional investigation and extension... Encourage students to continue their growth and commitment to protecting water resources by taking a leadership role independently to organized another project with the help and support of family, friends, teachers and community partners, perhaps in their own neighborhood.





THE GLOBAL WATER CRISIS

Upon completion of this activity, students will have a greater understanding of the hardships that the global water crisis has created for many populations of people in the developing world.

Contact H2O for Life to learn more about service learning and school partnerships. Visit h2oforliveschools.org

Background

An H2O for Life Walk for Water is an awareness-raising activity where students (and, perhaps, family members and community members) walk a specified distance carrying containers of water so that students may experience and relate to what it must be like for people who do not have clean water access. A 5 kilometer walk is the average distance that women and girls in developing countries must walk every day, typically carrying 20 liters of water. While this activity is often done by our partner schools to raise funds for the completion of WASH projects in communities in the developing world where access to water is in crisis, your students have much to gain by having this experience. Based on the age of your learners, pick a route and choose a water quantity, then embark on your walk for water. Upper Elementary and Middle School students can easily manage a 3 mile walk carrying a gallon of water. Be sure to repurpose the water at the end of the journey by watering trees or a rain garden, or returning the water to natural water resource such as a pond or

stream.

Here are some great resources about the Global Water Crisis:

United Nations Sustainable Development Goals: #6 Water and Sanitation for All

<https://goo.gl/V54mfJ>

About H2O for Life

<https://www.h2oforliveschools.org/page/about>

A Long Walk to Water - 3 minute video

<https://goo.gl/5yXJ9s>

Learning Target

Upon completion of this activity, students will have a greater understanding of the hardships that the global water crisis has created for many populations of people in the developing world.

Essential Questions

How? Why? What? What if?

- How do people get water when they do not have access to a clean water well or other source?
- Why has the global water crisis happened?

► Time Needed

30-60 minutes

► Materials List

1. Containers of water (liter, 2 liter or gallon), depending on the age of your learners



- What if we could help solve the global water crisis by raising funds for a WASH project?

Bridge

Introduce the activity with a connection to prior knowledge... Begin by asking students what they use water for each day, and where it comes from. Also ask them to guess how much water they think they use every day. They may be surprised to know that each of us uses 80-100 gallons of water every day! In the developing world, the average is just 4 gallons per day per person. Here are a few great questions to frame your discussion: If you had only 4 gallons of water per day rather than unlimited access, what would you have to give up?

How would your life change? What if the nearest water source was 3 miles away? What do you think has caused this water crisis for millions of people? Is there anything we can do to help solve this problem?

Engage

Make it real, make it fun, help them build new knowledge... If you have access to technology, showing your students the H2O for Life Video will be very helpful in creating context and connection with this activity. After having decided on a designated route, distribute one container of water to each student and have them carry their container on the walk, reminding them that this is what millions of

people do every day in order to survive.

Enrich

Ideas for additional investigation and extension... Empower your students to make a difference in the world by making their Walk for Water a fundraising activity. Contact H2O for Life to find out how to sign up for a partner school campaign. Your students will be rewarded with a learning experience that will last a lifetime, planting the seeds of civic engagement.

Reflect

What did you learn? What was surprising, fun, curious? What new question(s) do you now have?



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