



Can I Drink it?

Grade: K

Subject Areas:

Earth science, Social Science, Mathematics, Language Arts

Skills: classifying, describing, identifying, observing, sensing

Duration: 1 hour

Connections:

Local landforms, local water uses, water quality, resource management

Vocabulary

Water

surface water

clear?

cloudy

oily

odor

pollution

quality

slippery?

soapy?

Objective:

Students will be introduced to the importance of clean water and will use their five senses to test the quality of water.

Materials

- potable water (tap water)
- 25 plastic cups (5 for each station) (modify according to class size)
- vinegar
- biodegradable, non-harmful dish soap
- yellow food coloring
- cooking oil
- brown paper (4x8 inches) (one/student)
- see-through cup for discussion purposes
- paper towels (one/student)
- book: *The Freshwater Alphabet Book* by Jerry Pallotta
- drawing paper and pens

Standards

Strands: Excellence in Environmental Education Guidelines

Strand 1 — Questioning and Analysis Skills: C) Collecting information:

Learners are able to locate and collect information about the environment and environmental topics. **E) Organizing Information:** Learners are able to describe data and organize information to search for relationships and patterns concerning the environment and environmental topics

Strand 2.1 — The Earth as a Physical System: B) Changes in Matter:

Learners are able to identify basic characteristics of changes in matter

Strand 2.4 — Environment and Society: B) Places: Learners understand that places differ in their physical and human characteristics.

California State Educational Standards:

Physical Science 1a: Students know objects can be described in terms of the materials they are made of (e.g., clay, cloth, paper) and their physical properties (e.g., color, size, shape, weight, texture, flexibility, attraction to magnets, floating, sinking)

Investigation and Experimentation (I and E) 4a: Students will observe common objects by using the five senses.

I and E 4b: Students will describe the properties of common objects.

I and E 4e: Students will communicate observations orally and through drawings.

Background

On the Surface

Earth is often referred to as the water planet. Over 65% of the earth's surface is covered by water. From space, Earth appears mostly blue because the majority of the surface is covered by water. Approximately 97% of all water on Earth is salt water. Of the remaining 3% that is fresh water, most of it is locked up as ice forming the ice caps. This means only 1% of all water on Earth is easily available for human use and most of it is underground. It is hard to believe these statistics are true especially if you have ever stood on the banks of a large lake or a huge river.

It is important to begin getting young students aware of where they live. By holding up a globe of Earth, students can easily see that Earth has two main features: water and land. This concept relates well to introducing the needs of plants and animals relative to where they live.

The ocean is a vast place. As a matter of fact, life began in the ocean. Most animals on earth today live in or near water. It took billions of years for life to adapt and move onto land. Those plants and animals that live on land had to find ways of conserving water. People live on land and if we don't get enough water we become dehydrated. Some plants conserve water by storing it in special cells or organelles. The physiology of land animals was adjusted to conserve water through the addition of special glands like kidneys. Some behaviors including being active at night or hanging out in shady regions during a hot day also help conserve water.

Water is one of the most important natural resources.

Hydrology is the study of freshwater in all of its complexities. The hydrological cycle is the continual exchange of freshwater from its many forms and locations. This cycle purifies water. As water is evaporated off the surface of the earth it is transformed into a gas where it collects in clouds eventually making its way back to our waterways. As water falls to the surface much of it infiltrates into the layers of soil and sediments below. This underground water recharges aquifers which can be important sources of water in arid

regions. The other major water source for humans and wildlife is **surface water** such as lakes and rivers.

Water Worries

Essentially, the amount of available water has been unchanged for eons, but is not always in the right place at the right time. Some places on earth may be experiencing droughts while other places are experiencing floods. In addition, as human population grows, there is less water to go around. It is estimated that in the year 2000,

Local Connection

The Arcata Marsh and Wildlife Sanctuary (AMWS) is more than a convenient place to walk your dog or enjoy a wetland habitat. It is home to the City of Arcata's innovative wastewater treatment facility. Three large freshwater marshes are used as tertiary (last stage) treatment of water. Cattails, rushes and other aquatic plants and their host communities filter water before it is pumped back to the plant and released during outgoing tides. This progressive marsh project has received international recognition for smart municipal planning and has become a model for many other communities.

Besides the freshwater treatment marshes, the recently expanded sanctuary includes a small brackish lake, salt marshes and tidal sloughs which offer important habitat for a variety of birds and other wildlife. Here one can find over 5 miles of easy walking trails. Over 270 bird species have been recorded here along with many other critters including raccoon, river otter, foxes, frogs and garter snakes.

Friends of the Arcata Marsh (FOAM) is a non-profit organization that provides educational outreach, interpretation and restoration activities regarding wetlands and wastewater treatment. Regular interpretive walks are held and teachers can request a docent during school visits. On site is an interpretive center open every day which has informative displays, interactive exhibits, and art shows, along with a small gift shop. In addition, FOAM participates in a wide variety of community events including ones just for kids.

For more information call: 707-826-2359

the United States used 408 billion gallons of water every day.

Much human water use is hidden. The animals and plants that we eat or rely on for food and materials use a lot of water. To provide a typical meal of one hamburger, a soda and French fries, 1500 gallons of water are used. The clothes that we wear and the cars that we drive have hidden water in them. The steel used to manufacture one car uses 32,000 gallons of water and a 30 pound bike requires 480 gallons. To grow enough cotton for one pair of jeans uses 400 gallons of water. The consumptive needs of all of this water means there is less for wildlife.

There is a wide array of human uses for water including irrigation, transportation, manufacturing, and household needs. A negative side to the multitude of uses of water is water **pollution**. As more people inhabit our planet, non-polluted water sources are becoming more and more scarce. Water is polluted by metals, chemicals, oils and waste. Some sources like oil spills are easy to identify by sight by their **oily** films or foam. Other sources can be observed by the **odor** they give off, like sewage spills or a high sulfur content. However, many times it is difficult to detect polluted water. Unsafe water may show no signs detectable by our senses like some pesticide and bacterial contaminations. Water pollution in the King Range National Conservation Area (NCA) is often caused by the careless acts like diesel spills or the unintended runoff from pesticides and herbicide use.

Water Workers

There are many people trying to find solutions to our water problems. Limnologists study freshwater sources in regards to aquatic life.

Aquatic toxicologists study the effects of chemicals in our water on the health of people and other aquatic organisms. Hydrologists study the quantity, quality and availability of water to people and wildlife. In the King Range NCA, much work has been done to restore local rivers damaged by road building and improper logging practices. For young students, an important point to remember concerning water, is not all water is the same. Water can naturally be salty, **cloudy**, acidic, or smelly. Other times, water is polluted due to human activity.

Water **quality** refers to the cleanliness of water. The degree of water quality needed is not the same for all organisms. The quality for good drinking water is not the same as the quality level for a frog living in a pond. People could get very sick if they drank water from a pond. Water quality is usually measured by an assortment of tests. Everything from the amount of phosphates present in a water sample to the pH or acid level of that sample is used to evaluate its quality. We can all do our part to preserve this precious resource for us as well as the wildlife that depend on it.

Activity: Testing the Quality of Water

Preparation

Begin preparing five different water samples for each group by filling each plastic cup 1/2 way with water. In one sample, add 2-3 drops of yellow food coloring. In a second cup, add just enough vinegar to detect an odor. In the third cup, add a generous squirt of dish soap to give the water a slick, **soapy** feel, but with no suds. In the fourth cup, add 1 teaspoon of cooking oil. Keep the last cup pure water. Number each water sample 1-5. Throughout this activity every group will eventually explore one of each sample. Cut brown paper into pieces and set aside one per student.

Procedure

1. Set aside the water samples except for one see-through cup of tap water. Tell the students that the water you are holding came from the faucet and begin to ask them questions about it. It is optional to have a dirty cup of water to hold up for comparison.

- *Is this water safe to drink?*
- *How do we know it is safe?*
- *Where else can we find water? (lakes, rivers, swimming pools, puddles, etc.)*
- *How is drinking water different from the water we see in other places?*
- *Can we always tell if water is safe to drink?*
- *Why is some water unsafe?*
- *What are some senses we can use to tell if water is good or not?*
- *Are plants and animals ever threatened by polluted water?*

Materials

- potable water (tap water)
- 25 plastic cups (5 for each station) (modify according to class size)
- vinegar
- biodegradable, non-harmful dish soap
- yellow food coloring
- cooking oil
- brown paper (4x8 inches) one per student
- see-through cup for discussion purposes
- paper towels (one per student)
- book: *The Freshwater Alphabet Book* by Jerry Pallotta
- drawing paper and pens

2. Explain to the students that they will be using their five senses to investigate different water samples. Review their five senses with them first (hear, see, feel, taste, and touch). Write down each term using a different color for each one and have the students say them with you as you point to the words.

3. Make a game out of the five senses. Call out one as you point to the word and have them point to the body part used to sense it. For instance, point to and shout “touch” and the students should point to skin. Water in a cup won’t make any noise unless it is moving, however, we can often hear water such as drips, a faucet, a hose, or a waterfall. You may want to explain this to the students or have them explore this on their own.



Activity continued...

4. Divide the students up into five teams. Pass out a piece of brown paper to each student. Remind them that they will be using all five senses to investigate the properties of each water sample. Each team will stay at a station and will explore the water samples one at a time. *(Note: it is safe to have them take a little taste of each, but you may get a negative reaction especially with the soap.)*

5. Begin with a certain numbered water sample and pass it out to each group. Say "Let's investigate water sample number 1." Have them look at it, listen to it, sniff it, taste it, and touch it. As students touch each sample have them streak it on the brown paper. The oily one will leave an oily mark. Older students can write down words that describe the sample.

6. One at a time have the students investigate each sample 1-5. It is optional to write down some of the words used to describe each sample during the investigation or after. After all students have investigated all five water samples, pass paper towels around for them to clean their hands. Place one of each sample next to you with the number pointing out to review and share results. Have them guess which one (1-5) was the drinking water (tap water). Hold it up along with the number.

7. Begin with this sample and have them describe what they could see, (color, transparency), hear (in a cup they probably won't hear anything), feel (temperature, texture), smell (odor). Put down the words they come up with under two headings. Label one column "Drinking Water" and the other column "Other Water". Write down words to describe each. By comparing good drinking water to other water, students can begin to assess water quality on their own.

8. Remind them that drinking water and other water are different. It is also important to tell them that we cannot always use our senses to know whether water is safe to drink or not. Bring up the word "quality" and begin to discuss its meaning and how it pertains to water. Ask some follow up questions:

- What does the word "quality" mean?
- Have any of you accidentally tasted water from a pool or a river?
- What did it taste like?
- Do you think it is okay to drink from pools, lakes or rivers all of the time? *(Note: Around late August until the rains come, toxic algae blooms do occur in the local rivers. Dogs who drink the water have died, but this is infrequent. You may want to tell them that bad water can make us very sick.)*
- If we can't always use our senses to make sure water is safe to drink, how can people test it to know for sure? *(this make get them interested in chemistry).*

9. Gather the students around and read a book on water (see suggestion). To finish have them draw an imaginary place that has water in it. They could add plants and animals that live there. This could be a place with good clean drinking water or some other place.



Extensions

- Have them make a booklet about a topic relating to water (uses, transportation, animals, etc.).
- Find water songs and sing them (check out Project Wet Aqua Tunes).
- Further explore water by introducing evaporation and the role of the sun.
- Use the W in water to increase vocabulary by introducing other words that begin with W.
- Use water to introduce temperature.
- Reinforce the importance of personal hygiene by reminding them that we all need to wash our hands and brush our teeth..

References

- Arcata Marsh and Wildlife Sanctuary, Friends of the Arcata Marsh, <http://arcatamarshfriends.org/marsh.php>, 2011
- A-maze-ing Water, Project Wet: Curriculum & Activity Guide, The Watercourse and the Council for Environmental Education, Pg 219-222, 1995
- Water in Me curriculum, <http://www.teo.unt.edu/ecoplexweb>, 2010
- Water Science for Schools: <http://ga.water.usgs.gov/edu/mwater.html>, 2010

FOSS Connection

Grade K
Life and Earth Sciences:
Trees