



Pre/Post Visit Activities

Journey Through the Watershed

Lesson

Recommended for 4th - 6th grade

Lesson Description: Delve into the water cycle as your students become water molecules and move through each process of the water cycle. Learn how humans have influenced the water cycle and what technology has been developed to clean and transport this renewable resource.

Objective: Students will make the connection between the water cycle and its importance in our daily lives. They'll be able to describe the human and natural influences on the water cycle.

Idaho State Science Standards Met for Grades 4-6

4: 4.S.1.1.1, 4.S.1.2.1, 4.S.1.2.3, 4.S.1.8.1,

5: 5.S.1.2.3, 5.S.4.1.1, 5.S.5.1.1

6: 6.S.1.2.3, 6.S.4.1.1, 6.S.4.1.2, 6.S.5.1.1

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For more information, please contact:

Boise WaterShed Environmental Education Center ▪ (208) 489-1284 ▪ www.BoiseEnvironmentalEducation.org

Background Information

Water for Life

(Many of the following excerpts are taken and have been adapted from the book "Water...the Amazing Journey" by Caren Trafford and Megan Eriksson.)

Water - it covers more than 70% of Earth and is constantly on the move. Water may not look like much, but it is the reason that our planet is so often called the "Blue Planet." Without water, this planet would probably look like the moon or even Mars!

All life on Earth depends upon water for survival. Humans can go a few weeks without food, but only a few days without water. Our bodies are made mostly of water. Plants, animals, humans and all living creatures need water. Water is also important for everyday activities like brushing your teeth, cleaning the dishes and taking a shower.



Image courtesy of www.prelavac.com



Image courtesy of notesonwellness.blogspot.com



Did you know that water has been around for almost as long as this amazing planet? The water in your cup may have fallen from the sky as rain just last week, but the water itself has been around pretty much as long as Earth has! In fact, the water you drank this morning could have been in the stomach of a dinosaur many, many years ago! The water you ran in the sink may have been used by George Washington to take a bath or by Pilgrims to sail to America and begin a new life.

Image courtesy of www.epa.gov

Unique Properties of Water

What are the physical and chemical properties of water that make it so unique and necessary for living things? Pure water is virtually colorless and has no taste or smell.

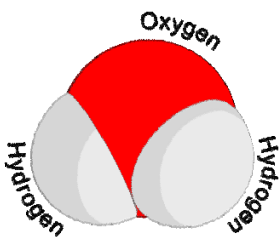


Image courtesy of www.sinap.com

You probably know that water's chemical description is H_2O . Water is made up of tiny bits called **atoms**. As the diagram to the left shows, that water is one atom of oxygen bound to two atoms of hydrogen. The hydrogen atoms are "attached" to one side of the oxygen atom, resulting in a water molecule having a positive charge on the side where the hydrogen atoms are and a negative charge on the other side, where the oxygen atom is.

Did you know that water is kind of like the Transformers? Water is unique because it is the only natural substance that is found in all three forms - liquid, solid (ice), and gas (steam) - at the temperatures normally found on Earth. Earth's water is constantly interacting, changing, and in movement.

Water freezes at 32° Fahrenheit (F) and boils at 212° F at sea level (but 186.4° F at 14,000 feet). In fact, water's freezing and boiling points are the baseline with which temperature is measured in the metric system: 0° on the Celsius scale is water's freezing point, and 100° is water's boiling point at sea level. Water is unusual in that the solid form, ice, is less **dense** (heavy) than the liquid form, which is why ice floats.

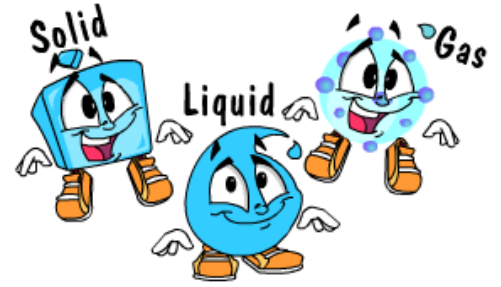


Image courtesy of www.thegreatwaterodyssey.com

It is very significant that ice expands and floats on water. The consequences of this action can be seen in broken water lines in the winter and potholes in the roads. In fact, the freezing and thawing action of water is largely responsible for the fracturing of rock and the formation of soils. Also, consider the consequences if lakes and streams froze from the bottom to the top - aquatic life would not even exist, and climate and weather patterns would be altered drastically.



Liquid water is found in many places. You see liquid water in a refreshing cup or glass, coming out of the faucet in your sink, when it rains outside, and running in the Boise River. Only about 0.36% of the planet's total water supply is found in lakes and rivers.

Image courtesy of www.fitnessmantra.info



Ice, snow, and frost are examples of **solid water**. Liquid water gets so cold that it freezes and turns into solid water. Winter is a season when you see a lot of solid water. Other examples of solid water are ice cubes, icicles and ice on a skating rink. About 75% of Earth's fresh water is frozen in polar ice caps and glaciers. About 90% of the planet's ice is in Antarctica.

Image courtesy of www.culliganlaredo.com



When it comes to **gas**, you don't see anything because gas is typically invisible. Liquid water gets hot and turns into a gas (also called steam or water vapor). When you boil a pot of water over the stove, chances are that you have seen water turn from a liquid into a gas. Maybe you have taken a hot bath or shower and seen the steam rising from the water.

Image courtesy of www.swe.org

Since opposite electrical charges attract, water molecules tend to attract each other, making water kind of "sticky." All these water molecules attracting each other means they tend to clump together. This is why water drops are, in fact, drops! If it wasn't for some of Earth's forces, such as gravity, a drop of water would be ball shaped -- a perfect sphere.

Water is called the "universal solvent" because it dissolves more substances than any other liquid. This means that wherever water goes, either through the ground or through our bodies, it takes along valuable chemicals, minerals, and nutrients. Ever wonder why the seas are salty? As water flows through waterfalls, rivers and streams, it picks up small amounts of mineral salts from rocks and soils in river beds and carries it all down to the sea. When the water in the oceans evaporates or freezes, the salt is left behind.

The Water Cycle

The one thing that water cannot do is continually multiply to make more water. Earth only has a limited amount of water. The water we have today is the same water we've always had. There is no new water. How can this be? Water keeps going around and around in what we call the hydrologic cycle, or **water cycle**.

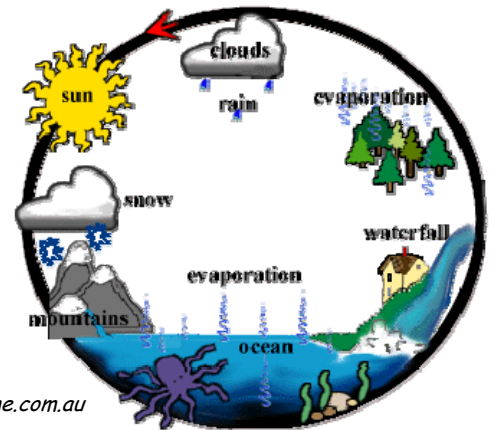


Image courtesy of members.optushome.com.au



Image courtesy of www.thesecondwave.us

Just like people put gas in their cars to make them go, the water cycle needs heat and energy from the sun to keep going Earth. Water cannot change from solid to liquid to gas without the help of the sun, and without water's ability to change forms, there would be no water cycle.

The water cycle changes forms in the water cycle in the following processes:

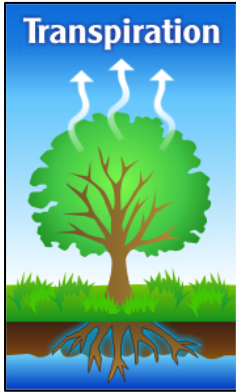
- **evaporation**
- **transpiration**
- **condensation**
- **precipitation**
- **sublimation**

Each of these words describes how water is able to change from one form into another as it moves around Earth. In other words, it changes from a solid to a liquid to a gas.

Evaporation: Evaporation happens when water turns from a liquid into a gas. Evaporation happens when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air.



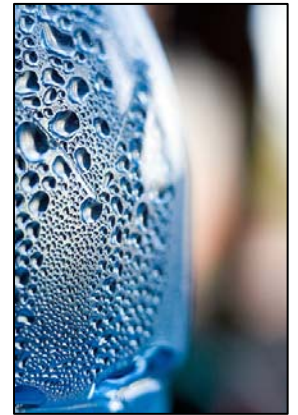
Image courtesy of blogs.trb.com



Transpiration: When humans sweat, we call this perspiration. When plants sweat, we call this transpiration. Transpiration happens as plants lose water out of their leaves. Water moves through a plant's roots all the way up to its leaves. When it finally gets to the leaves, the sun warms it up and turns it from a liquid into a gas. Transpiration gives evaporation a bit of a hand in getting the water vapor back up into the air.

Image courtesy of www.depweb.state.pa.us

Condensation: Water vapor in the air gets cold and changes back into liquid, forming clouds. This is called condensation. You can see the same sort of thing at home... pour a glass of cold water on a hot day and watch what happens. Water forms on the outside of the glass. That water didn't somehow leak through the glass! It actually came from the air. Water vapor in the warm air turns back into liquid when it touches the cold glass.



Precipitation: Precipitation happens when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the Earth in the form of rain, hail, sleet or snow.

Image courtesy of <http://flickr.com/photos/philthomas/640990482/>

Sublimation: Have you ever left your ice cube trays out in the freezer for a long time and noticed later that the ice seemed to have shrunk or disappeared?



Sublimation is a transition from the solid to gas phase with no intermediate liquid stage. Sublimation is most often used to describe the process of snow and ice changing into water vapor in the air without first melting into water. Dry ice is an example of sublimation. The opposite of sublimation is **deposition**, where water vapor changes directly into ice—such as snowflakes and frost.

So where on Earth can we find water in all of these different forms as it evaporates, transpires, condenses, precipitates or sublimates? In clouds, oceans, glaciers, groundwater, lakes, rivers, animals, plants and soil - just to name a few places. Water sure does take an incredible journey around the Earth through the natural water cycle!

Humans have created additional pathways for water to follow in the hydrologic cycle. Constructed systems and human uses in which water has been manipulated include drinking water treatment facilities, desalinization plants, wells, irrigation, industry, wastewater treatment facilities, septic systems, recreation, and urban and rural settings. The constructed water cycle presents new challenges to the collection and storage of water, not to mention the impact to water quality.

Human Uses of Water

Idaho is one of the most water-rich states in the country, with a multitude of rivers and lakes. It has the Boise, Snake, Salmon and Clearwater rivers and large lakes such as Pend Oreille, Priest, Henry's, Spirit and Coeur d'Alene. Idaho also has several large **reservoirs** (man-made water bodies) such as American Falls, Lake Lowell and Anderson Ranch. Because of this abundance, some Idahoans take their water for granted. Yet Idaho's water is limited and vulnerable.

According to the Sierra Club Middle Snake Group, the Boise River provides drinking water for 55,000 people, irrigates 300,000 acres of farmland, and hosts over 100,000 floaters a year. The Boise River flows for about 75 miles through southwestern Idaho, and is an important source of water for drinking, irrigation, fishing and recreation. People use water for many different purposes in Idaho, as demonstrated in the image above. Idaho is the second-largest water using state in the United States, consuming 22.3 billion gallons per day!



Image courtesy of <http://www.uiweb.uidaho.edu/wq/wqpubs/cis887.html>

Domestic use: There are about six billion people in the world today. Almost half of them live in towns and urban areas and are lucky enough to have water on tap. In these areas huge systems of pipes, dams and water treatment plants have been built to ensure a constant, clean supply of water. People use water for personal use - drinking water, washing, cleaning, cooking, bathing and irrigation. Drinking water for those living in urban areas is supplied by a local utility, which treats and transports the water through a network of pipes to individual homes and businesses.

In Boise, our drinking water is comprised of about 80% groundwater and about 20% Boise River water. In rural areas, many households use a private well to supply them with groundwater. In Idaho, approximately 95% of the state's drinking water comes from groundwater, either supplied by a private well or by a public water system.

In other parts of the world in which water is scarce, desalinization plants remove salt and minerals from the ocean to produce freshwater for domestic use and irrigation. Desalinization expends a lot of energy and has costly infrastructure that needs to be maintained. However, for coastal cities with no other option, this technology has proven effective. Worldwide, 13,080 desalinization plants produce more than 12 billion gallons of water a day.



Image courtesy of <http://www.industcards.com/>

Water eventually leaves our houses in toilets, sinks and drains. In urban areas, when wastewater leaves the house, it travels down a different set of pipes to a sewage treatment facility. If you live in Boise, water makes its way to either the West Boise or Lander Street wastewater treatment plant. Here, a series of physical, chemical, and biological processes clean the water and separate the waste from the water. Then, the cleaned water is released into the Boise River. In rural areas, many homes treat their wastewater on site with a septic system. A septic system works much like a wastewater treatment facility, but on a much smaller scale. Microorganisms break down the waste, while clean water passes out a pipe to a soil absorption area or filtering system. Septic systems must be maintained by the property owner for proper function.

Industrial Use: An industry is the manufacturing of a good or service within a category. Important industries in Idaho are food processing, lumber and wood products, machinery, chemical products, paper products, electronics manufacturing, silver and other mining, and tourism. The world's largest factory for barrel cheese, the raw product for processed cheese, is located in Gooding, Idaho. The Idaho National Laboratory (INL), a government lab for nuclear energy research, is also an important part of the eastern Idaho economy. Idaho also is home to three facilities of Anheuser-Busch which provide a large part of the malt for breweries located across the nation.



Image courtesy of <http://www.seds.com>

Industry and mining account for 2 percent of Idaho's water use. Mining uses about half of this water; food processing operations and pulp and paper mills use the rest. Industrial use accounts for about 10 percent of water withdrawn in the United States.



Image courtesy of pro.corbis.com

Agricultural Use: The use of water for agriculture has changed the production of crops dramatically in the 20th century. Agricultural use of water accounts for nearly 70% of the water used throughout the world, and the majority of this water is used for irrigation.

Agriculture is Idaho's largest industry and its largest water user. Agricultural water use in Idaho averages 21.6 billion gallons per day! Along with the irrigation of crops, the farmers that have **livestock** (cattle, sheep, etc.) must provide clean water for the livestock to drink.

Southwestern Idaho is a major cattle producer, as well as a producer of sugar beets, potatoes and seed crops. Also important to southwestern Idaho are fruit orchards. Idaho ranks fifth in the nation in the production of sweet cherries.

Most of the farm and ranch income in Idaho comes from a suite of seven major products. These are cattle, potatoes, milk, wheat, barley, sugar beets and hay. Of these products, cattle contribute the most economically, while potatoes are second.

Much of Idaho's economy centers around processing industries for Idaho farm products, such as plants for processing potatoes, sugar beets, and wheat. Over two dozen potato and sugar beet plants are found throughout the state. Many people in Idaho work in the food processing industry. For example, the Simplot potato-processing plant near Caldwell produces a large portion of the french fries sold at McDonald's restaurants throughout the nation.



Image courtesy of <http://oregonstate.edu>

Recreational Use: When it comes to water sports Boise has it all. Idaho's world-class fishing, backpacking and river running attract outdoor enthusiasts from all over the world. Just 5 miles from Boise is Lucky Peak Dam with miles of waterways for boating, sailing and swimming. The Boise River, which runs through downtown Boise, is a popular spot for tubing, canoeing, and fishing. Power boating and sailing is also popular in the Cascade Reservoir, Payette Lake, Warm Lake, Black Canyon, Arrow Rock, Anderson Ranch and Owyhee Reservoirs. The nearby Payette and Salmon Rivers are known worldwide by kayakers and rafters for their exciting white water.

Hydropower and Hydroelectricity: "Hydro" is another word for water. Hydropower has been used for hundreds of years. Around 200 B.C. water wheels were invented. These were used to grind grain and irrigate crops. Did you know that water wheels are the ancestors of modern day hydroelectric power?

Hydroelectricity is electricity generated by **hydropower**, which is the production of power through use of the gravitational force of falling or flowing water. Hydropower is the result of flowing water turning enormous blades in turbines.

To make electricity using hydropower, water needs to be stored in vast quantities, so a lake or reservoir is created by building a dam. Some dams in the Boise River watershed include Anderson Ranch Dam, Arrowrock Dam, Lucky Peak Dam and Barber Dam. After the water collects in the lakes, the dam gates are opened allowing some of the water to flow through a series of pipes that get smaller and smaller. As water makes it way through, it speeds up and finally pushes against the blades of a turbine, which spin a generator to create electricity. Water is then carried through more pipelines and rejoins the river downstream.



Anderson Ranch Dam and Power Plant

It is a multiple-purpose structure that provides benefits in irrigation, power, and flood control. The plant supplies power to irrigation loads in the Boise, Owyhee, and Minidoka Projects as part of the Bureau of Reclamation's Southern Idaho Power System. *Image courtesy of www.usbr.gov*

*** FUN FACTS ***

- Worldwide, about 20% of all electricity is generated by hydropower.
- In the United States alone, hydropower accounts for about 10% of our electricity.
- Idaho has 136 hydroelectric plants, capable of producing 2,648 megawatts of electricity.
- Idaho Power Company serves 360,000 customers in Idaho, eastern Oregon and Nevada. About 40% to 60% of that power comes from hydroelectric power.
- Lucky Peak Dam is a rolled earthen dam. The dam is 2,340 feet long and 340 feet high. The storage capacity of the reservoir is 300,000 acre feet. The reservoir is 12 miles long with 45 miles of shoreline.
- The Boise River Diversion Dam Power Plant is capable of producing 3.4 megawatts, enough power to heat and light approximately 2,500 homes.

The Bureau of Reclamation is the second largest producer of hydroelectric power in the United States, with operations and facilities in 17 western States.

*Image courtesy of
www.frugalyankee.com*

How Humans Affect Water When We Use It

Water is essential to many human activities, but we tend to alter it when we use it, and often times this is not for the better. Water droplets see a lot of dirty business. Even where there is plenty of fresh water, people, industry and agriculture still manage to make it unclean. There is an estimated 7,500 miles of polluted water worldwide - more than the total amount of water contained in the world's largest river basins.

Water pollution affects more than just humans. It destroys freshwater ecosystems that are home to a great number of animals, birds, fish and all those tiny critters you can't even see. Because of pollution, 20% of freshwater fish are threatened, endangered, or have become extinct.

Migratory fish of the Snake River drainage have been harmed by dams, and some are threatened with extinction. As a result, the National Marine Fisheries Service has been asked to list several species of salmon as threatened or endangered.



Image courtesy of <http://www.riverlaw.us>

Logging practices have a major effect on water quality. The major threats from logging are **erosion** (the process by which the surface of Earth is worn away) and **stream sedimentation** (the buildup of rocks, gravel, dirt and debris) caused by improper road building and by transporting trees from the forest to the road. Sedimentation can **degrade** habitat for fish and interfere with river navigation.

Water quality is also affected by **grazing** in riparian areas. Livestock prefer to eat the lush vegetation near water, and overgrazing may result in trampled plant communities, broken down stream banks and increased stream sediment, higher water temperature and bacteria from livestock waste in and around the stream.

Mining and industrial activities can ruin water quality by polluting waterways with **heavy metals** and **toxic chemicals**. For example, the South Fork of the Coeur d'Alene River in Idaho is limited to industrial use only because of high concentrations of lead, zinc, arsenic and cadmium from past mining.

Agriculture can have a big impact on water quality in Idaho. Both sediment and **agricultural chemicals** (fertilizers - types of plant food - and pesticides - used for pest/bug removal) can ruin water quality.



Image courtesy of www.nissanchem.jp

Pesticides and fertilizers have extended human lives, improved the quality of life and provided us with a safe and inexpensive food supply. However, when misused, many of them can be dangerous. Fish kills and human both have been linked to exposure to or swallowing of some agricultural chemicals found in water supplies.

Households can **degrade** water supplies by improperly getting rid of common chemicals used around the home, workshop and garage. Unused or expired medications, antifreeze, lawn and garden pesticides and paint thinners are just a few of the chemicals that can **impair** water supplies if poured down sinks or dumped in landfills.



Image courtesy of <http://www.ci.austin.tx.us>

Faulty **septic systems**, household storage systems for waste, when waste cannot flow through underground pipes at a home to a city's sewer system, can expose water supplies to harmful bacteria. And, like farm fields, lawns and gardens improperly treated with fertilizers and pesticides can **contaminate** water supplies through erosion and runoff.

Water mismanagement, waste, pollution, industry overuse and the continuing increase in the world's population are all using up the fresh supplies of water. Over the last 100 years, demand for fresh water around the world has risen 700%. Idaho does not have enough water for all uses to grow indefinitely nor do all uses maintain water quality. Idahoans must carefully manage their limited water resources to ensure enough high-quality water for the future.

What Can Idahoans Do?

People everywhere should be thinking about what they could do to make a difference in our water use and water supply. It begins with small steps - and you can help!

Much can be done to use water more efficiently in Idaho. Because 70% of the world's fresh water is used for irrigation, any improvement in crop planting, watering and harvesting will have a big effect on fresh water supply. Better use of water, such as drip irrigation, where the watering system is applied to the roots of suitable plants and crops, is one easy way to save water and still get great crops. It works at home in the garden too.

Individuals can cut back on how much water they use around the house for cooking, cleaning, washing, bathing, showering and watering the lawn and plants. Everything we do to conserve, or use less, water will help to ensure there will be water for future generations.



Image courtesy of www.iam.ubc.ca

Monitoring and cleaning up polluted rivers and stopping the destruction of forests and wetland regions will help conserve water and will help provide more clean water for the millions of people that barely have a cup per day. Nature's wetlands clean water naturally. **Wetlands** are marshes, swamps, bogs, and similar areas. Wetlands can be found in nearly every county and climatic zone in the United States. Some are wet all of the time; some may look completely dry most of the time. have been lost. An estimated 300-400 million people live near wetlands. We now know that wetlands are valuable **natural resources**. Wetlands

help regulate water levels within watersheds; improve water quality; reduce flood and storm damages; provide important **fish and wildlife habitat**; and support hunting, fishing, and other recreational activities.

About 80% of Boise's drinking water comes from deep underground wells. Since so much water comes from underground, it is important to try to put some back too. It is possible to put water back in the ground. This process is called groundwater recharge. Some water companies have discovered how to store water when they have a **surplus** (extra supply) and re-use it in times of drought. An **aquifer** (an underground body of porous rock filled with water) acts like a giant sponge which stores extra water when it is available.



Image courtesy of www.inkaquatic.blogspot.com

Conclusion

How much would you pay for a clean glass of water? How much should factories and farmers pay for water? The more water we use, the more water must be treated or cleaned, and that costs money. If people had to pay for the hidden costs of clean water, would they be more careful with it? In drought-prone areas, water is being rationed and fines are being imposed on those who squander water or use it unwisely. Industry is beginning to pay for the true price of using water, instead of just having water as "an almost-free" resource.

Stewardship

Environmental stewardship is taking personal responsibility for the natural environment. It is up to you and everyone on our planet to take care of our natural resources for today—and tomorrow. **Sustainability** is widely defined as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs.



Image courtesy of computing.fs.cornell.edu

How You Can Help

Every person—including you—has the chance to make a difference by practicing environmental stewardship. Look for opportunities at home, at school, at work, in your community, and while shopping and traveling. The possibilities are endless, and the cumulative impacts of individual actions can really add up.

Watershed Stewardship Ideas

Join a student or citizen water monitoring group - work on water quality sampling or monitoring projects. Take a snapshot of the health of the Boise River watershed. Citizen groups, families, schools and individuals may check out a water quality testing kit throughout the year from the Boise WaterShed. Each group will be provided with a basic water quality testing kit to test the water's temperature, pH, dissolved oxygen and turbidity. Sign up today by calling the Boise WaterShed at 489-1284 or send an e-mail to BoiseWaterShed@cityofboise.org. You can also contact the Boise WaterShed to find out the date of the next community-wide Citizen Monitoring Day event.

Mark storm drains in Boise - Storm drain marking is a visible reminder that storm drains are for stormwater only. Marking involves people educates and increases awareness about the importance of the river and the environment. Contact Aimee Hughes, Environmental Education Specialist, with Boise Public Works at 384-3901 or send an e-mail to AHughes@cityofboise.org to reserve marking kits. Aimee will assist you with selecting an area in town that needs marking, such as neighborhoods, shopping malls or parking lots.



*Image courtesy of
Partners for Clean Water*

Clean up a designated area - Any day of the year, you can call the Boise WaterShed for gloves and trash bags for a cleanup. The Boise RiverSweep is an annual event the second Saturday in September designed to give back to the river that gives so much to us.

Volunteers, students, and concerned citizens join together to clean up the Boise River to help provide a safe and clean Boise River for our community to use for many generations to come. The City of Boise's Adopt the Greenbelt program is designed to help keep the Greenbelt and Boise River clean and safe to use. As a participant, you can adopt a 1/2 to 2/3 mile section of the Greenbelt to inspect and care for throughout the year. This program allows you to work when your schedule allows. To find out more about Boise RiverSweep or Adopt A Greenbelt, contact Jerry Pugh at 384-4060, Ext. 319.



Image courtesy of City of Boise

Plant appropriate vegetation - to prevent erosion on banks or upland slopes. You can plan to do this with a group any day of the year, or as an event to celebrate Arbor Day or Earth Day. Join the Boise Parks & Recreation Community Forestry Unit and other volunteers, and help plant trees along the streets of Boise. ReLeaf Boise is the City's annual volunteer tree planting program which is associated with American Forest's Global ReLeaf campaign. Contact Jerry Pugh at 384-4060, Ext. 319 for additional information.

Organize a poster or poetry contest or an essay, photography or model-building contest with a watershed theme - Each year, in affiliation with The Library of Congress, River of Words, a nonprofit organization, conducts a free international poetry and art contest for youth on the theme of watersheds. The contest is designed to help youth explore the natural and cultural history of the place they live, and to express, through poetry and art, what they discover. The contest is open to any child in the world, from 5-19 years of age. There is no charge to enter. Visit www.riverofwords.org/contest/index.html for more information.

Start a watershed group - The U.S. Environmental Protection Agency (EPA) also has helpful resources for you to learn more about environmental issues. The Watershed Patch Project <http://www.epa.gov/adopt/patch/patch2004.pdf> is a collection of watershed activities designed for schools, science clubs, and community organizations. The Kid's Club webpage <http://www.epa.gov/kids/> is colorful cartoon that is easy to navigate and leads visitors through different sections of how-to and other insightful information. The Explorers' Club is a site designed for children, ages 5 - 12, seeking information about the state of the global environment. Students can ask an environmental question in the "Ask EPA" section.

Journey Through the Watershed Matching Game

Match the picture on the left with the correct definition to the right. Write the letter of the correct definition in the blank numbered spot next to the picture.



1. _____

A. Transpiration

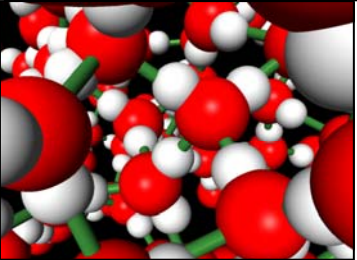
B. Pollution

C. Agriculture

D. Hydropower

E. Evaporation

F. Water molecules



2. _____



3. _____



4. _____



5. _____



6. _____

Journey Through the Watershed Lesson Review

1. Why is water so important to life on Earth? _____

2. What is "H₂O," or water, made of? _____

3. In what 3 forms does water exist?

1. _____

2. _____

3. _____

4. Circle the correct answer: The Earth is constantly getting a new supply of water. True False

5. Give one example of each of the following five processes of the water cycle:

Evaporation: _____

Transpiration: _____

Condensation: _____

Precipitation: _____

Sublimation: _____

6. Name at least 5 places that water moves in, through, or to in the constructed, or human influenced, water cycle?

7. Compare and contrast the movement of water through natural and constructed systems.

Answer Keys

Matching Game Answers

1. E
2. F
3. B
4. C
5. A
6. D

Lesson Review Reference Pages

1. Why is water so important to life on Earth? (Refer to page 2 for the answer.)
2. What is "H₂O," or water, made of? (Refer to page 3 for the answer.)
3. In what 3 forms does water exist? (Refer to page 3 for the answer.)
4. Circle the correct answer: The Earth is constantly getting a new supply of water. True False
5. Give one example of each of the following five parts of the water cycle: Evaporation, Transpiration, Condensation, Precipitation, Sublimation (Refer to pages 6 and 7 for the answer.)
6. Name at least 5 places that water moves in, through, or to in the constructed, or human influenced, water cycle?
7. Compare and contrast the movement of water through natural and constructed systems.

Boise WaterShed Library Resources

Take advantage of these FREE library resources for check-out from the Boise WaterShed Library Resource Center. Call (208) 489-1284 to reserve for a two-week period.

Videos, DVDs & Software

Blue Planet IMAX VHS by Smithsonian Institution's National Air and Space Museum and Bureau of Reclamation Snake River Office 2000, 16 minutes
Clean Water Begins with You! by Partners for Clean Water, 2008, 12 minutes
Conserve Everyday DVD by American Water Works Association, 15 minutes
Consider the Source: An Interactive Guide to Protecting America's Drinking Water by U.S. EPA
Earth Aid: Water Conservation DVD by View Video
Lockheed Corporation in Association with NASA, 2001, 42 minutes
Our Water Cycle DVD by American Water Works Association, 15 minutes
Science Court Water Cycle Teacher's Guide and CD-ROM
Spirits of Irrigation: A Story of Idaho's Water DVD by Idaho Water Users Association and
The Water Cycle and WATER: Who Needs It? by California Department of Water Resources, 2001, 27 minutes
Water and Weathering DVD by Video Learning System v.4 by Fogware, 75 minutes
Water Facts by The Groundwater Association
Whadd'ya Know About H₂O? DVD by American Water Works Association, 20 one-minute segments

Educator Resources

Discover a Watershed: Watershed Manager Educators Guide by Project WET, 2002
Healthy Water, Healthy People Water Quality Educators Guide by Project WET, 2003
Healthy Water, Healthy People Water Quality Testing Kit Manual by Project WET, 2002
Kids in the Creek by Bonneville Power Administration
PNW Water Quality & Monitoring Program, by USDA Cooperative State Research, Education and Extension Service/Land Grant Colleges and Universities
Professor Water and the Amazing Water Cycle by American Water Works Association
Project Wet Curriculum & Activity Guide, Project WET International/CEE, 2008
Save Our Seas by California Coastal Commission, 2003
The Water Cycle Video Activity Packet for Grades K-3 and 4-6 by California Department of Water Resources
Water: Who Needs It? Video Activity Packet for Grades K-3 and 4-6 by California Department of Water Resources

Kids Books

A Drop of Water by Walter Wick, 1997
Just Add Water: Science projects you can sink, squirt, splash, sail, Jennifer A. Roth, 2008
Outside, Inside by Carolyn Crimi, 1995
The Magic School Bus Gets Cleaned Up by Kristin Earhart, 2007
The Murky Water Caper by Deborah Rodney, 2001
Water by Trevor Day, 2007
Water...the Amazing Journey by Caren Trafford and Megan Eriksson, 2007
Water by Susan Canizares and Pamela Chanko, 1998
Why Should I Save Water by Jen Green, 2001

Internet Resources

<http://www.dnr.state.wi.us/org/caer/ce/eeek/earth/groundwater/watercycle.htm>

The **Wisconsin Department of Water Resources** invites you to click on the water cycle image on their home page to learn about different parts of the watershed. Links lead you to additional pages where you can complete an online water quiz and/or word search and read an online water poem.

<http://www.idwr.idaho.gov/water/wateruse.htm>

The **Idaho Department of Water Resources** has excellent figures for how much water is used for a variety of applications in Idaho, including stock watering, community use and domestic use.

<http://www.agclassroom.org/kids/stats/idaho.pdf>

The **Idaho Agriculture in the Classroom** program has created "A Look at Idaho Agriculture" PDF with specific facts about Idaho's agricultural industry.

http://www.nass.usda.gov/Statistics_by_State/Idaho/index.asp

The **United States Department of Agriculture (USDA) National Agricultural Statistics** webpage has many links to click on to gain an overview of agriculture in Idaho and to find out statistics by county and throughout the state of Idaho.

<http://hydropower.inl.gov/hydrofacts/index.shtml>

The **Idaho National Laboratory** has comprehensive facts about how hydropower works, types of hydropower facilities, hydropower's historical progress, primary purpose or benefits of U.S. dams, undeveloped hydropower potential by state, and more.

<http://ga.water.usgs.gov/edu/wuhy.html>

The **United States Geological Survey (USGS)** provides an overview of hydroelectric power water use throughout the nation, and advantages and disadvantages of hydropower.

<http://www.idahomining.org/resources.html>

The **Idaho Mining Association** offers fast facts about mining in the state. The entire website offers an excellent overview on mining operations.

<http://www.wildidaho.org/programs.php>

The **Idaho Conservation League** has several links to click on from their homepage to learn more about the effects of different industries to Idaho's air and water quality.

<http://protectingwater.com/>

This project was originally jointly funded by a Federal Clean Water Act grant from the U.S. EPA and the **Hawaii State Department of Health Clean Water Branch and the City and County of Honolulu Department of Environmental Services**. It explains how individuals are solutions to pollution and teaches about different pollution sources.