

FRWA Curriculum Guide

Week I – Middle School

Water

Its Uses and Importance

Background Information

Water– Its Uses and Importance

“It is water, in every form and at every scale, that saturates the mind. All the water that will ever be is, right now.” National Geographic, Oct. 1993

Water – nero – vatten – agua – wasser – Water means different things to different people.

- To a chemist, water is H₂O, a molecule composed of one oxygen and two hydrogen atoms.
 - To a biologist, water is nourishment necessary for all living things.
 - To an ecologist, water is a habitat hosting a world of interrelated species.
 - To municipalities and towns, water is a utility to be managed and sustained.
 - To a farmer, water is necessary for strong and productive crops.
 - To a firefighter, water is a useful tool for extinguishing flames.
 - To a tanker captain, water is a means of transporting goods.
 - To a young child, water is a refreshing way to cool off on a summer day.
 - To many areas of the world, water is not as accessible.
 - To all of us, water is life.
- What makes water so important to so many people?

Adapted from Haskin, Kathleen M. Claryville, 1995, *The Ways of the Watersheds: An Educators Guide to the Environmental and Cultural Dynamics of New York City’s Water Supplies*, NY: The Frost Valley YMCA

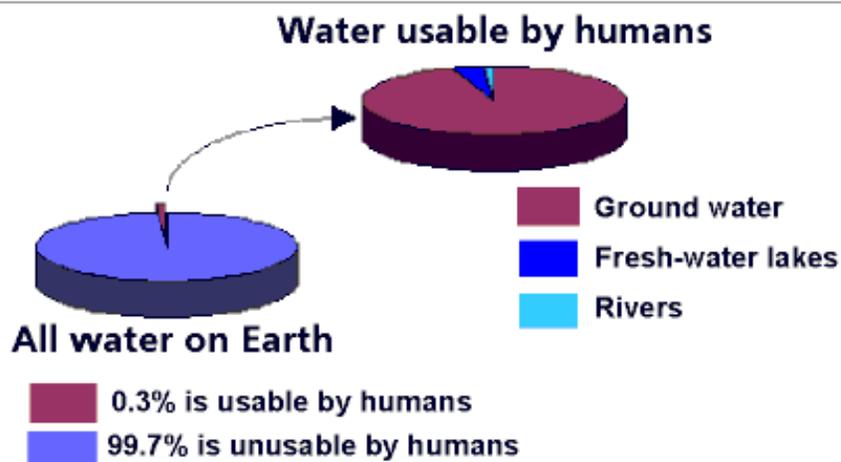
BACKGROUND:

Water is essential to all living creatures. It is a precious natural resource, but a limited one. Although the earth is 75% water, it is not all available to us. The global distribution of water breaks down as follows:

Water source	Water volume, in cubic miles	Percent of total water
Oceans	317,000,000	97.24%
Icecaps, Glaciers	7,000,000	2.14%
Ground water	2,000,000	0.61%
Fresh-water lakes	30,000	0.009%
Inland seas	25,000	0.008%
Soil moisture	16,000	0.005%
Atmosphere	3,100	0.001%
Rivers	300	0.0001%
Total water volume	326,000,000	100%

Source: Nace, U.S. Geological Survey, 1967 and
The Hydrologic Cycle (Pamphlet), U.S. Geological Survey, 1984

How much of Earth's water is usable by humans?



This means that there is less than one percent of fresh water available to us for drinking, washing, brushing our teeth, etc.

Some interesting water facts follow:

- There is approximately the same amount of water on Earth today as there was when the Earth was formed. Water is continually recycled in the Earth's hydrologic cycle. The dinosaurs once drank the same molecules as those that are from your faucet.
- The human brain is 75% water.
- Each day, the sun evaporates 1,000,000,000,000 (one trillion) tons of water (United States Geological Survey).
- At least one billion people must walk three hours or more to obtain drinking water (National Geographic Society).
- One inch of rain falling on one acre of land is equal to about 27,154 gallons of water (United States Geological Survey).
- The 250 million residents of the U.S. have access to the same amount of fresh water as residents did 200 years ago, when the population was four million (National Drinking Water Alliance).
- One percent of the water on earth is available for human consumption.
- Seventy – five percent of a living tree is water.
- You can survive a month without food, but only 5 to 7 days without water.

Food Facts:

1. It takes **6 gallons** of water to make **one order of french fries**.
2. More than **2,600 gallons** of water are needed to produce **one serving of steak**.
3. The average American consumes **1,500 lbs. of food** annually. It takes **1.5 million gallons** to produce food for just one person!
4. Approximately **6,800 gallons of water** are used to feed a **family of four** for one day.
5. **100 gallons** of water are needed to grow **one watermelon**.

Environmental Facts:

1. Only 7 % of the country's landscape is considered riparian, or alongside water— only **2 % of which still supports riparian vegetation**.
2. Of the 1200 species listed as threatened or endangered, **50% are dependant on wetland**

habitats.

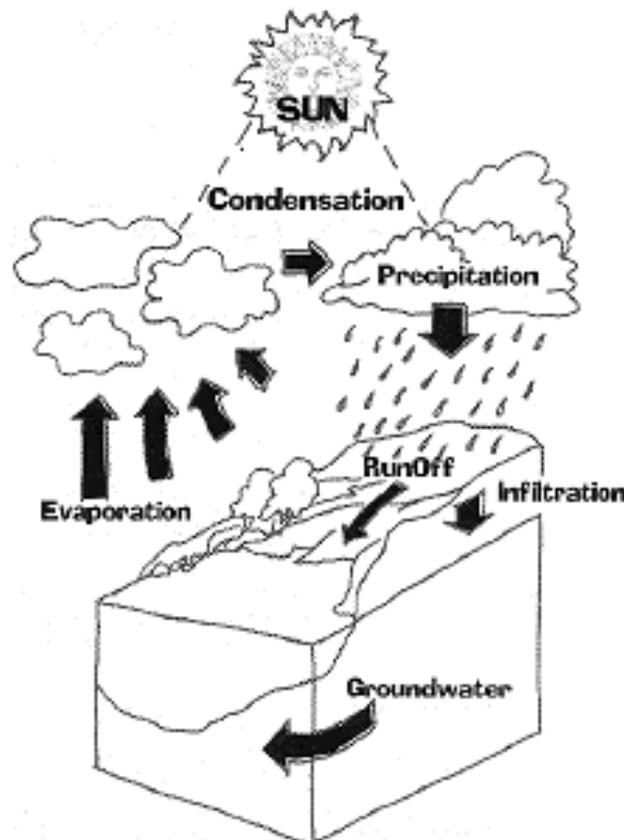
3. Freshwater species are disappearing **5 times faster** than land animals.
4. **53,000 cubic miles** of water pass through Earth's lakes and streams.
5. If all of the water in the world were to fit in a gallon jug, the available freshwater would equal only **1 teaspoon**.

Human Facts:

1. **1.2 billion** of the world's people do not have access to clean water.
2. The United States consumes water at **twice the rate** of other industrialized countries.
3. **6.8 billion gallons** of water are flushed down American toilets each day.
4. **80 %** of freshwater used in the United States goes to irrigating crops and creating hydroelectric power.
5. To survive, the average person needs **2 quarts** of water a day.
6. An average person will drink about 16,000 gallons of water in their lifetime.

THE WATER CYCLE:

The Earth's surface water is recycled among the plants, animals, and atmosphere in a process known as the hydrologic or water cycle. The water cycle refers to the movement of water through the environment by the process of evaporation and condensation. The heat from the sun causes water to evaporate into the atmosphere, and precipitation brings it back down to the earth's surface. The water evaporates, which means that it changes to water vapor. Water vapor rises because it is lighter than cold air. It then cools and turns into liquid water, called condensation, and forms into clouds. Eventually, the rains, snow or hail falls (precipitation) and the cycle begins again!



Source U.S. Geological Survey

The water cycle controls the distribution of the earth's water as it evaporates from bodies of water, condenses, precipitates, and returns to those bodies of water. Water may be used by plants and animals, frozen in glaciers, evaporated back into the atmosphere, or flow through our waterways. Waterways are part of a watershed.

A watershed, or drainage basin, is a region that drains into a particular body of water. It is an area of land where water from precipitation drains into an individual stream, lake or other body of water. It includes all the water, land, animals, plants, and people within a certain area. Any precipitation that falls that is not used by plants, animals, or people, flows into the watershed in a specific manner. The elevations and topography of the land determine the direction and flow of the water. The bodies of water within a watershed all play a part in how the water flows through the watershed.

Water that stays on the surface of the land is termed surface water and water that seeps into the ground is termed groundwater. Groundwater seeps down through the soil until it reaches rock material. The rock material that is below the surface of the Earth is called bedrock. Bedrock consists of many types of rocks, such as sandstone, granite and limestone. As spaces develop between the rocks, water can then accumulate for water storage. Humans play a vital role in the protection of this essential resource.

Farmington River Watershed is a sub-basin of the Connecticut River Watershed. The Farmington River, itself, is a water supply and recharge area for drinking water for over 600,000 people in the greater Hartford region and Farmington Valley. According to the *State of the Farmington River Watershed Report*, dated August 2003, water resources of the Farmington River Watershed provide 100 percent of the drinking water for about 600,000 people in the Greater Hartford area, including Bloomfield, East Hartford, Farmington, Glastonbury, Hartford, Portland, Newington, Rocky Hill, South Windsor, West Hartford, Wethersfield and Windsor. Many of the towns are not located within the watershed, but rely on drinking water stored within the watershed.

Drinking water may be stored in a variety of ways. Reservoirs are one way in which water is stored within the watershed. Dams prevent the flow of water and therefore, collection basins, or reservoirs, are established.

Water travels through an intricate system in order to reach our faucets. Beginning in the northwest hills, two surface water suppliers, Barkhamsted Reservoir and Nepaug Reservoir hold 30.3 and 9.5 billion gallons of water, respectively. Water flows by gravity through pipes to two Metropolitan District Commission (MDC) treatment facilities in West Hartford and Bloomfield, which filter 50 and 21 million gallons of water a day. Once treated, this water flows to the towns previously mentioned.

Approximately 90 percent of the towns in the Farmington River Watershed use groundwater as a drinking water supply, with 32 public water supply wells producing about 8 mgd (million gallons per day). In Simsbury, for example, the Aquarion Water Company provides drinking water to approximately 14,000 residents from groundwater. This groundwater is recharged by the Farmington River Valley aquifer that is intimately connected to the Farmington River.

An aquifer is an underground storage area for water. Water in aquifers is stored in spaces or pores of rocks below the surface of the ground. Wells can be drilled into the aquifer and water may be pumped out. Rain can eventually recharge, or add, water to the aquifer. The Farmington River helps to recharge the Farmington River Valley aquifer, but at the same time, the aquifer helps to maintain base flows in the Farmington River. Protecting the Farmington River reduces the pressures on the Farmington River Valley aquifer, and vice versa.