



Investigate Fresh Water

What is one thing we all share and can't live without?

GRADE LEVEL

- 3-6

SUBJECT AREAS

- Earth Science, Life Science, Environmental Science, Ecology, Health

SKILLS

- Analyze, Interpret, Apply, Evaluate, Technology

VOCABULARY

Adaptations, aquatic, binoculars, carnivorous, channel, desert, drought, elevation, erosion, fresh water, gravity, ground water, industry, lake, migrate, pressure, reproduce, river, spring, survive, terrestrial, tributary, wetland, vegetation

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MEASURABLE OBJECTIVES

The learner will:

- Identify and describe different fresh water and terrestrial habitats.
- Give examples of animals that live in fresh water and/or terrestrial habitats and how they rely on fresh water.
- Explain why the protection of fresh water and/or terrestrial

habitats is important.

- Give examples of actions that individuals can take to protect fresh water.

BACKGROUND AND TEXT OVERVIEW

INTRODUCTION

About 3% of all the water on earth is fresh water—the rest is salt water found in the ocean. Although this might not sound like a lot, it is enough to support all life, as long as we take care of it and respect it. All life requires fresh water to survive.

BACKGROUND OR READER TEXT

WHAT IS FRESH WATER?

About 3 percent of all the water on earth is fresh water—the rest is salt water found in the ocean. Fresh water is found as surface water, ground water and ice.

Surface water includes still waters, such as lakes, ponds and wetlands (swamps and marshes) and running water such as rivers and streams. Lakes can contain fresh or salty water. In fact, if the Caspian Sea in Asia is considered a lake, more than 40 percent of all lake water is salty (the Caspian Sea contains more than $\frac{3}{4}$ total volume of the world's salty non-ocean water). Lake Baikal in Siberia is the world's largest fresh water lake and contains more water than all five of the North American Great Lakes (Superior, Huron, Michigan, Ontario and Erie) combined!

Water in rivers and streams represents only a small quantity of all fresh water, but rivers and streams are a key part of the water cycle—responsible for moving water great distances across the land and to the ocean.

Ground water is fresh water stored underground in aquifers—rock layers where water is stored in the pore spaces inside rocks. There is much more fresh water stored underground than in all the lakes and streams. Ground water can be found almost anywhere on the planet, although its quality, quantity and depth vary. Springs occur where ground water meets the Earth's surface.

All ice (glaciers, icebergs, sea ice, etc.) is fresh water—salt from the ocean does not freeze into the ice.

FRESH WATER FOR LIFE

All life requires fresh water to survive. Fresh water habitats include lakes, ponds, streams, rivers and wetlands. Animals such as birds, fish and amphibians and many different kinds of plants call these habitats home. However, fresh water is vital in other habitats, as well. Terrestrial, or land based, habitats vary in the amount of moisture they receive. Rainforests are very wet habitats and deserts are very dry. Animals and plants use water differently in these places, but must find water to survive.

WEATHER, CLIMATE AND FRESH WATER

Although climate and major weather patterns are driven by the ocean, lakes and other fresh water features can contribute to local weather conditions.

Drought is a period of water shortage, when lack of precipitation produces dry conditions lasting as long as several years. People store water in reservoirs and water tanks to prepare for drought. What do plants and animals do? Some have adaptations to help them live in dry conditions. For example, a saguaro cactus can store hundreds of gallons of water for use during drought. Desert tortoises can recycle water within their bodies so they don't need to drink often. They can get most of the water they need from the plants they eat. Even in a desert, not all animals and plants are equipped to survive drought. Frogs, fish, birds and other aquatic animals that live in rivers or springs may not survive if their habitats dry up and they can't relocate to a new water source. Lack of water causes stress for plants and animals. When they are weakened by drought, they are more likely to get sick. Other effects of drought can include insect infestations and more forest fires. You may see fewer wildflowers and more weeds, birds may migrate at different times of year than usual and animals may have fewer babies.

FRESH WATER SHAPES THE LAND

Fresh water is a powerful force in shaping the landscape. Rivers erode or breakdown rock to form canyons. Rivers and lakes also deposit sediment to build up land in other areas.

HUMANS AND FRESH WATER

Humans need fresh water to survive. Humans affect fresh water on planet Earth. We remove fresh water from lakes, streams and underground aquifers for

drinking and use in our homes and communities. Humans divert water in streams flowing into lakes and cause water levels to change. Humans also create reservoirs of fresh water by building dams to control flooding, regulate their water supply for agricultural and urban needs and to create power. Fresh water also affects humans. Floods and droughts can have dramatic and sometimes catastrophic effects on humans and our communities.

ACTIVITIES

INVESTIGATE FRESH WATER ACTIVITY

Please see *Investigate Fresh Water Activity* student copy page.

ANSWER KEY

Please see *Investigate Fresh Water Activity* answer key.

TAKE ACTION!

POSTER ITEMS

1. Catch and release native fish when fishing and never dump left over bait into the water.
2. Participate in a river, pond or highway cleanup project to keep trash out of the water.
3. Clean up after pets so waste does not enter nearby streams.

ACTIVITIES

ASSESSMENTS

PRETEST/POSTTEST

Before students visit the *Investigate Fresh Water Unit* of the *Discover Water* website, have them take the following quiz to see what they already know about Fresh Water.

ONLINE POP-UP TEXT

Deserts—A desert is an area that gets very little rainfall and can be hot or cold. Because of the lack of fresh water, deserts don't support much vegetation. Plants are usually low to the ground and adapted to store water. Animals that live in deserts also have adaptations to cope with the lack of fresh water. Animals found in deserts include insects, spiders, scorpions, reptiles, birds and small mammals.

Kangaroo rats (*Dipodomys spp.*)

- Kangaroo rats have amazing adaptations that allow them to get all their water from the dry seeds they eat.
- Kangaroo rats have adaptations that allow them to not lose much water as waste or by sweating or panting.
- To help conserve water and remain cool, kangaroo rats are nocturnal — only leaving their underground burrows at night.

Barrel Cactus (*Ferocactus spp.*)

- Barrel cacti live in dry environments but store water inside their tissues.
- They have thorns (modified leaves) that help reduce moisture loss and keep away browsing animals.
- Barrel cacti can be cut open and the water inside consumed in emergency situations.



Wetlands—Wetlands are areas where the soil is wet and spongy. Examples of wetlands include marshes, swamps and bogs. Wetlands exist all over the world, except Antarctica, so a very wide variety of plants and animals can be found in wetland areas.

North American Beavers (*Castor canadensis*)

- Beavers' large teeth grow throughout their lives—they gnaw on wood to help keep their teeth from growing too long.
- Beavers construct family homes called lodges and dams using the wood they cut down. (Discover the Missouri River)
- Beavers have clear eyelids that they use to see underwater.
- Beavers are the largest rodents native to North America and can weigh up to 90 pounds. (Discover the Missouri River)

Venus flytrap (*Dionaea muscipula*)

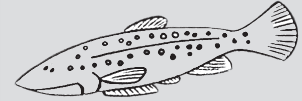
- The Venus flytrap is a carnivorous (meat-eating) plant that gets additional nutrients by dissolving and digesting insects in its modified trap-like leaves.
- Even though they "eat" insects, they are plants and therefore also perform photosynthesis.
- Venus flytraps are rare and are found in peat bogs in the Southeastern United States.



River—A river is a natural stream of fresh water flowing through a channel towards the sea. Smaller tributary channels join into and flow from the larger river stem. Rivers flow from higher elevation to lower elevation due to gravity. Rivers are important to humans for industry, recreation and as a source of fresh water. Rivers also provide habitat to many different kinds of animals.

Rainbow Trout (*Oncorhynchus mykiss*)

- Rainbow Trout are named for the rainbow colored patterns along the sides of their bodies.
- Most Rainbow Trout spend their entire lives in rivers or lakes, but some migrate down rivers to the ocean. These fish must return to the place where they were born to reproduce.
- A female Rainbow Trout creates a “nest” using her tail along the river bottom and can lay up to 8,000 eggs at one time.



Common Cattail (*Typha latifolia*)

- Cattails are plants that provide dense cover for many aquatic animals and nesting birds and food for other creatures. They also help protect riverbanks from erosion.
- Cattails like to grow in soil that stays very wet or even in shallow standing water at the edges of rivers, lakes and wetlands.
- Native Americans wore the leaves and stems into baskets.

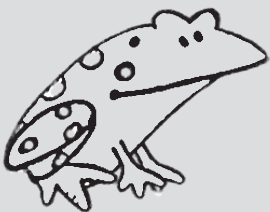
Spring—A spring is a place where fresh water from underground emerges at the earth’s surface. Ground water collected in underground tunnels and channels can be forced to the surface by the pressure of the water. Water from a spring may pool as a pond or flow as a stream. Some spring waters are hot and others are very cold. Some contain minerals or carbonation (the fizz in your water). Some spring waters are bottled for drinking.

Toads (*Bufo spp.*)

- Although toads are found in many places, they need shallow pools to lay their eggs and are commonly found in and around springs.
- Toads are most active at night when males “croak” to attract females.
- Unlike frogs, toads have rough skin, short legs for hopping and no teeth. They can often be found further from water than frogs.

Common Rush (*Juncus effusus*)

- Although the Common Rush looks like a grass, it isn’t.
- Rushes often grow in wet soil or very shallow water.
- The underwater portions of the plant provide habitat for many small invertebrates and vertebrates.



Lake—Lakes are large bodies of water surrounded by land. Lakes can be fresh water or salt water. Lakes are important to humans for industry, recreation and as a source of fresh water. Lakes also provide habitat for many different kinds of animals.

Common Loon (*Gavia immer*)

- Loons have calls that sound like yodeling.
- Loons are named for their awkward movement when walking on land.
- Loons need open water to be able to take flight, and sometimes get stranded when they mistake wet parking lots for lakes.

American White Waterlily (*Nymphaea odorata*)

- The white waterlily grows in still water up to four-feet deep.
- Its leaves float, providing resting places for frogs, toads and insects. The leaves also shade the water and help keep it cool.
- This plant is native to the Eastern U.S., but in the West it is considered a non-native invader that disrupts aquatic ecosystems.



Have students take the same quiz again as a posttest to measure learning.

PRETEST/POSTTEST ANSWER KEY

1. All of the above
2. False
3. True
4. All of the above
5. True
6. All of the above
7. All of the above
8. True
9. Where underground water meets the Earth's surface
10. True

CRITICAL THINKING QUESTIONS

LEVEL 1

What is one thing we all share

and can't live without?

Although there are a few things this answer could address (air, land, etc.), the point is to discuss water, specifically fresh water. Answers might explain that fresh water is necessary for life to survive and is a resource we all share.

LEVEL 2

It is obvious why fresh water is important in fresh water habitats like rivers—explain why fresh water is still important in terrestrial (land) habitats such as deserts.

Answers should include discussion about how animals and plants that live in terrestrial environments still need fresh water to survive.

LEVEL 3

Create a list of at least three things you can do personally

that will help protect or conserve fresh water habitats. Explain how your actions will affect fresh water.

Answers could include actions such as cleaning up after pets (keeping pet waste from contaminating fresh water), participating in a river, pond or highway cleanup project (keeping trash out of fresh water habitats) and telling parents to fix oil leaks under the car so oil doesn't wash into fresh water systems.

WHAT DID I LEARN? ONLINE QUIZ ANSWER KEY

Q. How much of Earth's water is fresh water?

A. 3%

Q. Deserts can exist in both hot and cold climates.

A. True

Q. An example of a wetland is _____.

A. A bog, a swamp and a marsh

Q. Rivers flow from higher to lower elevation due to gravity.

A. True

Q. All lakes contain fresh water?

A. False, some lakes contain salt water

EXTENSIONS

Ideas for ways to support and expand lesson plans about this topic or provide additional activities for advanced learners.

- Research additional animals and plants from each of the habitats in the Investigate Fresh Water Activity
- Assign each student or group of students a habitat and have them construct a diorama showcasing organisms from that habitat
- Challenge students to research and identify additional terrestrial and fresh water habitats and draw a poster with facts showing what they would include if they could add a "binocular" view to that habitat

RESOURCES

PROJECT WET RESOURCES

Project WET KIDS (Kids in Discovery Series) Booklets

- [Celebrate Wetlands](#)
- [Discover Bays and Estuaries](#)
- [Discover Floods](#)
- [Discover Ground Water & Springs](#)
- [Discover Ports and Harbors](#)
- [Discover Storm Water](#)
- [Discover the Colorado River](#)

- [Discover the Missouri River](#)
- [Discover the Red River](#)
- [Discover the Rio Grande](#)
- [Discover the Waters of Arizona](#)
- [Discover the Waters of Nebraska](#)
- [Discover the Waters of Nevada](#)
- [Discover the Waters of New Mexico](#)
- [Discover the Waters of Tennessee](#)
- [Discover Drought](#)
- [Fish & Fishing](#)
- [Healthy Water, Healthy People](#)
- [Native Waters Sharing the Source](#)
- [On the Water Route of Lewis & Clark](#)
- [Explore Sagebrush Prairie](#)
- [Watershed Protection](#)

Project WET Curriculum and Activity Guide 2.0 Activities

- [8-4-1, One for All](#)
- [A-maze-ing Water](#)
- [A Drop in the Bucket](#)
- [A Grave Mistake](#)
- [Common Water](#)
- [Discover the Waters of Our National Parks](#)
- [Humpty Dumpty](#)
- [Just Passing Through](#)
- [Reaching Your Limits](#)
- [Springing Into Action](#)
- [Storm Water](#)
- [Sum of the Parts](#)
- [The Life Box](#)
- [The Pucker Effect](#)
- [There is No Away!](#)
- [Water Quality? Ask the Bugs!](#)
- [Wetland Soils in Living Color](#)

ADDITIONAL STUDENT RESOURCES

Bowden, Rob. 2003. *Water Supply: Our Impact on the Planet*. Chicago, IL: Heinemann Library.

Dorros, Arthur. 1993. *Follow the Water from Brook to Ocean*. Madison, WI: Demco Media.

Hollyer, Beatrice. 2009. *Our World of Water*. New York, NY: Henry Holt and Company.

Project WET. 2008. *Water is Life*. Bozeman, MT: The Project WET International Foundation.

ADDITIONAL EDUCATOR RESOURCES

Dickerson, Daniel L., John E. Penick, Karen R. Dawkins, and Meta Van Sickle. 2007. "Groundwater in Science Education." *Journal of Science Teacher Education*, 18 (1), 45-61.

Gleick, Peter, et al. 2009. *The World's Water: The Biennial Report on Freshwater Resources, 2008-2009*. Washington: The Island Press.

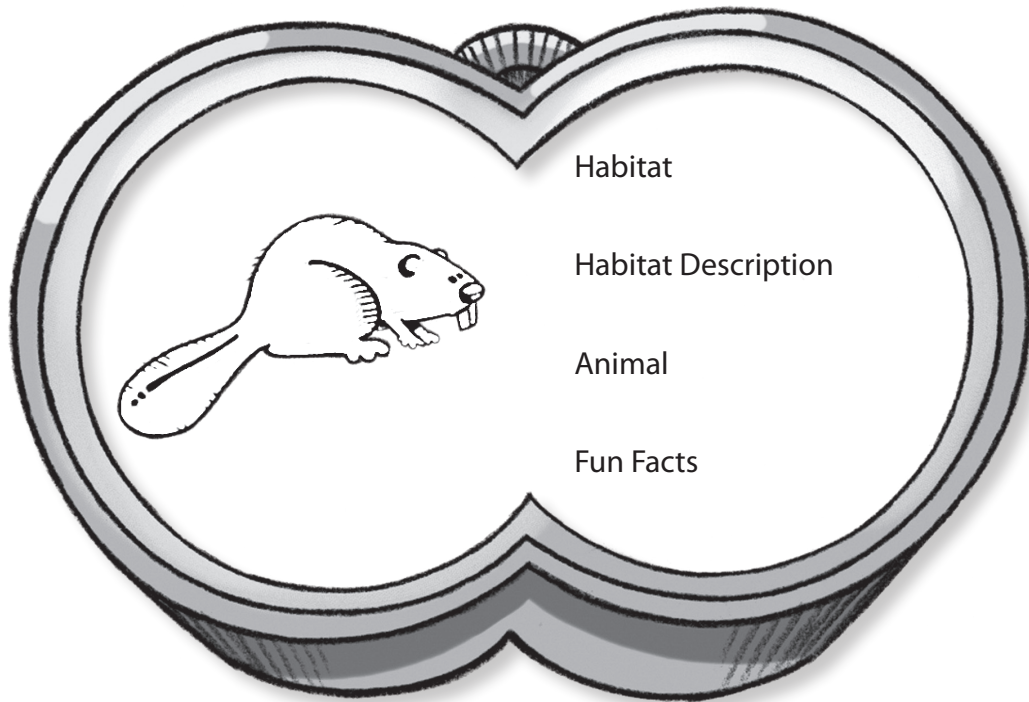
Heinhorst, Sabine and Gordon Cannon. 2004. "Nature: Water, Water, Everywhere, nor Any Drop to Drink." *Journal of Chemical Education*, 81 (2), 170-171.

McDuffie, Thomas. 2007. "Precipitation Matters." *Science and Children*, 44 (9), 38-42.

Shoring, Nola. 2003. "Investigating Fresh Water--Some Ideas That Have Been Used Successfully in Primary Schools in the ACT." *Investigating*, 19 (2), 28-30.

INVESTIGATE FRESH WATER ACTIVITY *(also in My Science Notebook)*

As you complete the online *Investigate Fresh Water Activity*, add information about each animal or plant you discover. You can also sketch in features of each animal or plant's habitat.

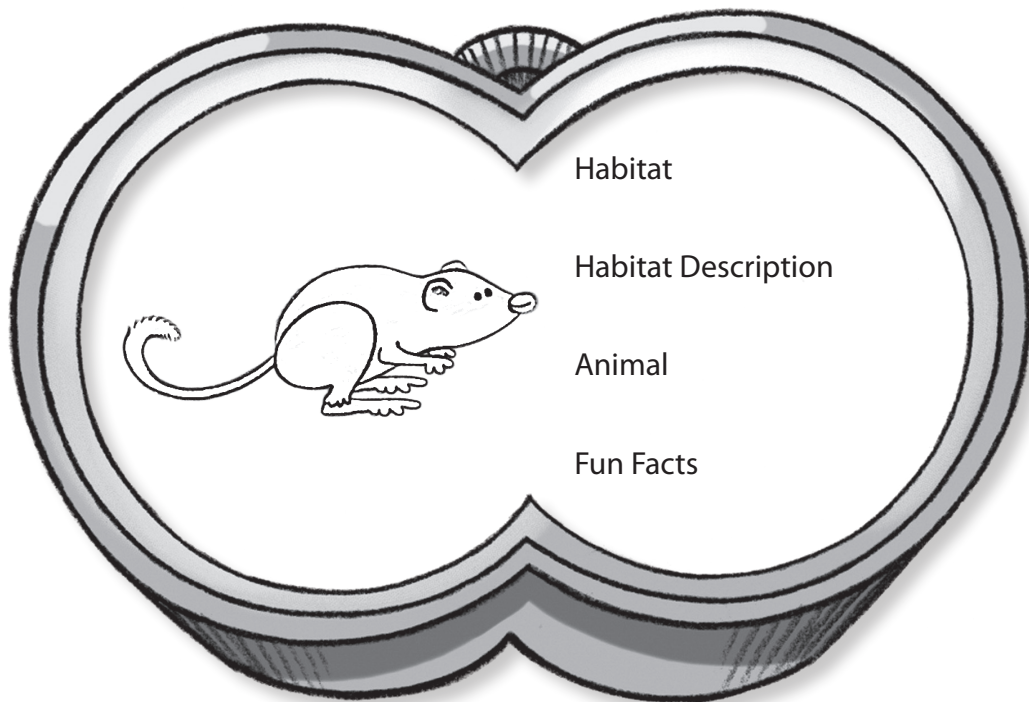


Habitat

Habitat Description

Animal

Fun Facts

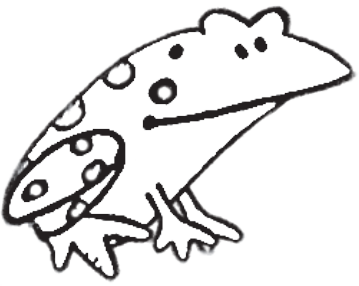


Habitat

Habitat Description

Animal

Fun Facts




Habitat

Habitat Description

Animal

Fun Facts

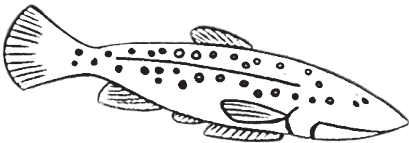


Habitat

Habitat Description

Animal

Fun Facts

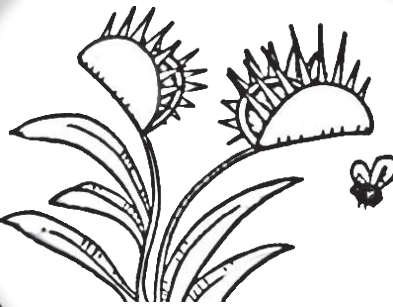


Habitat

Habitat Description

Animal

Fun Facts



Habitat

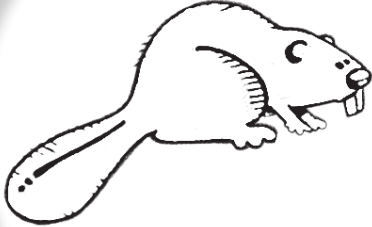
Habitat Description

Plant

Fun Facts

INVESTIGATE FRESH WATER (ANSWER KEY)

Answers should be similar to those below:

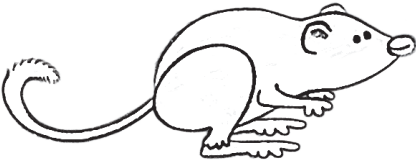


Habitat
Wetlands

Habitat Description
Areas like marshes, bogs and swamps where the soil is wet and spongy

Animal
North American Beaver

Fun Facts
Beavers have clear eyelids so they can see underwater

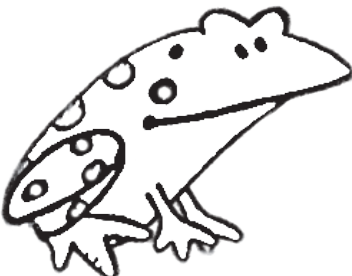


Habitat
Desert

Habitat Description
A dry area that gets very little rainfall

Animal
Kangaroo Rat

Fun Facts
These animals lose very little water as waste

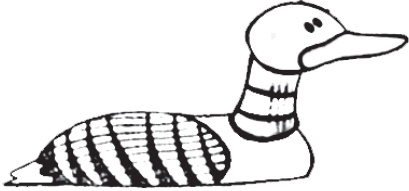


Habitat
Spring/pond

Habitat Description
A spring is a place where water emerges from underground, and it may pool into a pond

Animal
Toad

Fun Facts
Male toads croak to attract females water as waste

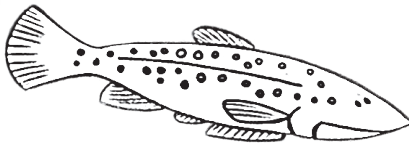


Habitat
Lake

Habitat Description
A body of water surrounded by land

Animal
Common Loon

Fun Facts
Loons have a call that sounds like yodeling

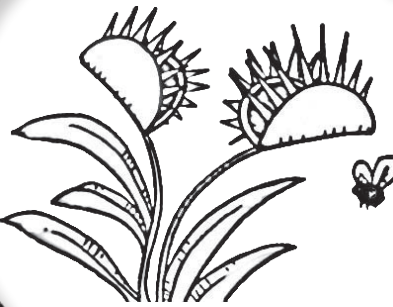


Habitat
River

Habitat Description
A stream of fresh water flowing through a channel

Animal
Rainbow Trout

Fun Facts
A female rainbow trout can lay up to 8,000 eggs at one time



Habitat
Wetlands

Habitat Description
Areas like marshes, bogs and swamps where the soil is wet and spongy

Animal
Venus Flytrap

Fun Facts
This plant is carnivorous and dissolves insects for nutrients

Investigate Fresh Water Unit Pretest/Posttest

1. Fresh water can be found _____.
 - a. Under ground
 - b. In lakes and rivers
 - c. In wetlands
 - d. All of the above
2. True or false, rivers and streams contain a large quantity of all the fresh water on Earth.
3. True or false, all ice contains fresh water.
4. Fresh water is important to animals that live in _____.
 - a. Lakes
 - b. Rainforests
 - c. Deserts
 - d. All of the above
5. True or false, lakes and rivers can contribute to local weather.
6. Signs of drought can include _____.
 - a. Insect infestations
 - b. Forest fires
 - c. More weeds
 - d. All of the above
7. Humans build dams and create reservoirs to _____.
 - a. Control flooding
 - b. Regulate water supply
 - c. Create power
 - d. All of the above
8. True or false, Lake Baikal in Siberia contains more water than all of the North American Great Lakes combined.
9. A spring occurs _____.
 - a. Where the ocean meets the land
 - b. Where a river meets a lake
 - c. Where underground water meets the Earth's surface
 - d. Where wetlands dry up
10. True or false, a river can shape the land.

Score: ___/10