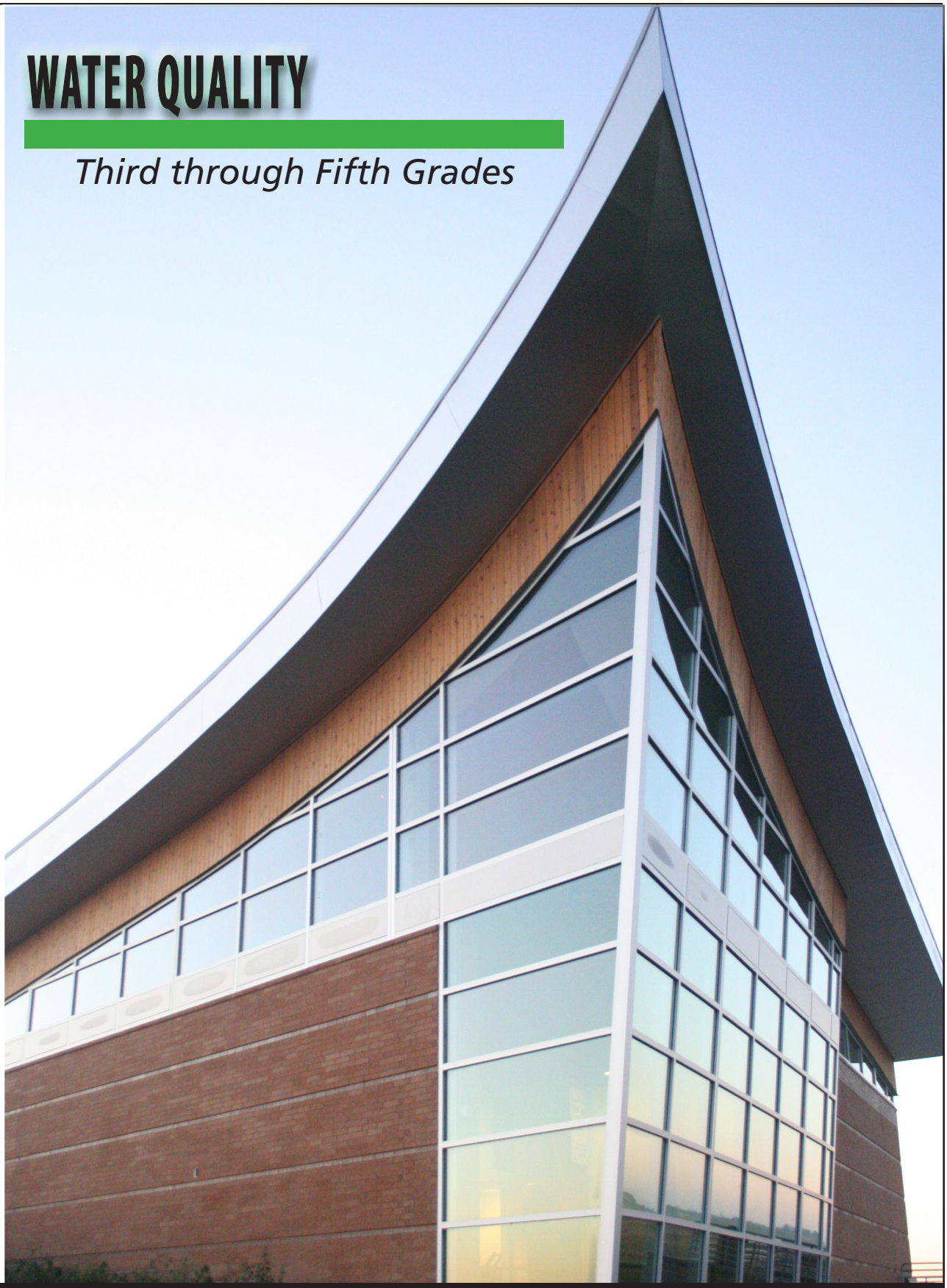
Free Land was the Cry!

WATER QUALITY

Third through Fifth Grades



Homestead

National Park Service
U.S. Department of the Interior

Homestead National Monument
of America, Nebraska

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Coordinator

Tina Miller, Education Coordinator
Homestead National Monument of America

Teacher Ranger Teachers

Craig Rafert, Social Studies Teacher at Sutton, NE
Ellen Janssen, Fourth Grade Teacher at Beatrice, NE

Layout Artist

Shayde Goracke-Voller, Graphic Designer

Primary Authors

MaryLou Alfieri, Fifth Grade Teacher at Omaha, NE
Tina Miller, Education Coordinator at Homestead National Monument of America
Aubrey Streit Krug, graduate student at the University of Nebraska-Lincoln
Tracy Tucker, graduate student at the University of Nebraska-Lincoln

Curriculum Interns

Sasha Denton, History major at Doane College
Andy Fuxa, Communications major at Nebraska Wesleyan
Leah Goossen, Art major at the University of Nebraska-Lincoln

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Merrith Baughman, Chief of Interpretation and Resource Management, Homestead National Monument of America
Mark Engler, Superintendent, Homestead National Monument of America
Stuart Hollman, proofreader
Tricia Parker, Reading/Writing Director, Nebraska Department of Education
Deb Romanek, Mathematics Director, Nebraska Department of Education
Vicki Scow, World Language Education, Nebraska Department of Education
Summer Stephens, Director of Curriculum and Assessment, Beatrice Public Schools
Larry Starr, Director of Social Studies, Nebraska Department of Education
Jim Woodland, Director of Science, Nebraska Department of Education

TABLE OF CONTENTS

This unit has Pre-Visit Activities for teachers to use to prepare students for a visit to Homestead National Monument of America, a Ranger-Led Experience which will occur during your visit, and Post-Visit Activities for teachers to use to expand students' knowledge of the impact the Homestead Act of 1862 had on America.

Some of the ideas in this lesson may have been adapted from earlier, unacknowledged sources without our knowledge. If the reader believes this to be the case, please let us know, and appropriate corrections will be made. Thank you.

PROGRAM DESCRIPTION

Have you ever looked at a glass of water and wondered how old the water was? The water in the glass may have fallen from the sky as rain just a few days ago, but the water itself has been around in one form or another pretty much as long as the earth has.

The water in your glass was part of the oceans that immigrants crossed to come settle in America. It was part of the rivers and streams that homesteaders crossed to settle the west. And you thought your parents were old!

The earth has a limited amount of water, so it keeps going around and around and around in what is called the "Water Cycle". Because of the cyclical nature of water, we must be careful with our water use in both quantity and quality. Activities and field experiences in this program help students answer these questions about the water cycle, watersheds and how they can help maintain a healthy water cycle.

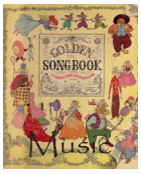
SPECIAL ICONS

Indicates a reproducible handout is included

Indicates an additional science activity

Indicates an additional math lesson

Indicates an additional social studies lesson



Indicates an additional music or art activity

Indicates an additional language arts lesson

CURRICULUM OBJECTIVES

- Students can name basic information about the water cycle.
- Students can describe basic processes of watershed.
- Students can construct a diagram of the water cycle.
- Students can explain how the water cycle functions.
- Students can describe several impacts on water quality.
- Students develop potential ideas for avoiding loss of water quality.
- Students will conduct scientific experiments.

NATIONAL STANDARDS

NL-ENG.K-12.4 COMMUNICATION SKILLS

- Students adjust their use of spoken, written, and visual language (e.g. conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.

NL-ENG.K-12.7 EVALUATING DATA

- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g. print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

NL-ENG.K-12.8 DEVELOPING RESEARCH SKILLS

- Students use a variety of technological and information resources (e.g. libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

NS.K-4.1 SCIENCE AS INQUIRY

As a result of activities in grades K-4, all students should develop

- Ability to do scientific inquiry
- Understanding about scientific inquiry.

NS.K-4.4 EARTH AND SPACE SCIENCE

As a result of activities in grades K-4, all students should develop an understanding of

- Properties of earth materials
- Objects in the sky
- Changes in the earth and sky.

NS.K-4.5 SCIENCE AND TECHNOLOGY

As a result of activities in grades K-4, all students should develop

- Abilities of technological design
- Understanding about science and technology
- Abilities to distinguish between natural objects and objects made by humans.

NS.K-4.6 PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop an understanding of

- Personal health
- Characteristics and changes in populations
- Types of resources
- Changes in environments
- Science and technology in local challenges.

NS.5-8.1 SCIENCE AS INQUIRY

As a result of activities in grades 5-8, all students should develop

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry.

NS.5-8.3 LIFE SCIENCE

As a result of activities in grades K-4, all students should develop an understanding of

- Structure and function in living systems
- Reproduction and heredity
- Regulation and behavior
- Populations and ecosystems
- Diversity and adaptations of organisms.

NS.5-8.6 PERSONAL AND SOCIAL PERSPECTIVES

As a result of activities in grades K-4, all students should develop an understanding of

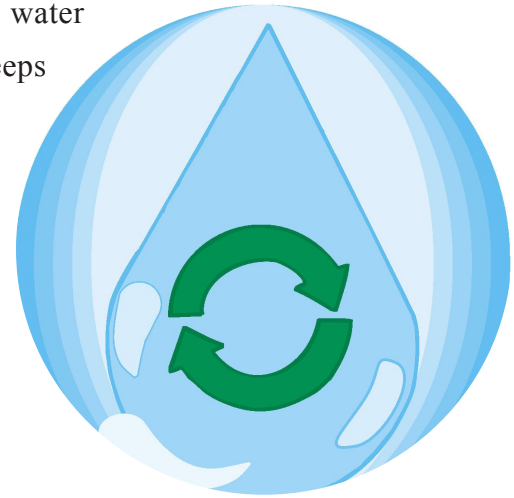
- Personal health
- Populations, resources, and environments
- Natural hazards
- Risks and benefits
- Science and technology in society.

Pre-Visit Activity #1 (suggested)

THE WATER CYCLE

The water you drink comes in three different forms. It can be a liquid, a gas or a solid.

When water moves from one form to another that is called the water cycle. The earth has a limited amount of water so the water keeps going around and around and around in the water cycle.



The water cycle is made up of a few main parts. They are:

Evaporation – when the sun heats up the water and turns it into vapor or steam wind can also cause water to evaporate.

Condensation – when water vapor in the air gets cold and changes back into liquid, forming clouds.

Precipitation – occurs when water has condensed so much 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.

Collection – when water falls back to earth as precipitation.

To learn more about the water cycle visit these two websites:

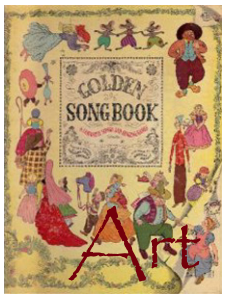
http://www.epa.gov/safewater/kids/flash/flash_watercycle.html

Thirstin is the EPA's mascot for water quality. This flash site takes 4-5 minutes to explain the water cycle.

http://techalive.mtu.edu/meec/module01/title.htm

Interactive flash site that illustrates the water cycle. Students can select the amounts of rainfall, the size of particles in the soil, work with maps, and a host of other things to manipulate water quality.

Other Activities

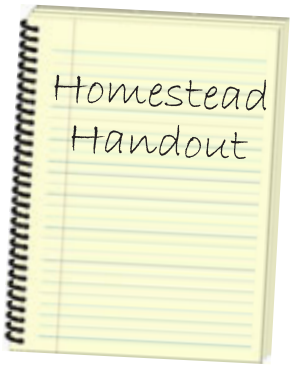


Have students draw water in each of its different forms.

THE WATERSHED CONCEPT

Pre-Visit Activity #2 (suggested)

The water on the Earth is stored in the oceans, ice caps and glaciers, groundwater, lakes, atmosphere, rivers, plants, animals and soil. It is the movement of this water, via precipitation, runoff, evaporation, transpiration and infiltration that has the potential to move pollutants from one place to another. Watersheds are the land area draining water (through runoff) into a particular stream, river or lake.



Discuss with students the watershed concept and vocabulary.

Watershed vocabulary:

Condensation	Permeable	Water Cycle
Evaporation	Precipitation	Watershed
Groundwater	Runoff	Water Table
Infiltration	Transpiration	

Definitions are provided in the Additional Resources section.
A crossword puzzle is also available to reinforce the concepts.

Ask the students what they think their local watershed area is. Have students visit the Environmental Protection Agency Surf Your Watershed website to discover the area of your local watershed.
http://cfpub.epa.gov/surf/locate/index.cfm

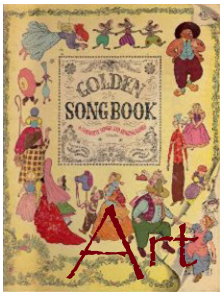
Water

Visit Bell Museum website in small groups and complete the interactive games.

http://www.bellmuseum.org/distancelearning/watershed/watershed2.html

The intermediate level of this game is appropriate to 3-5 graders, as they are asked to make decisions affecting water quality that must be balanced with other concerns.

Other Activities



Have students draw and label each part of the water cycle.

Pre-Visit Activity #3 (suggested)

IS YOUR CREEK OR POND HEALTHY?

Water Pollution

If you see pollution or trash in/around a creek, pond or other body of water you may think it is unhealthy right away. But what if there were no obvious indicators such as trash? For example, when people toss unused prescriptions down the toilet these prescriptions can pollute the water. How would you tell how healthy the creek or pond is? With macroinvertebrates of course!

Macroinvertebrates are aquatic insects that spend part of their life cycle in the water. Each one has a different tolerance to water pollution. Here are various macroinvertebrates and their water pollution tolerance.

Pick a macroinvertebrate from the lists on the next page and draw a diagram of its life cycle.

IS YOUR CREEK OR POND HEALTHY?

Pre-Visit Activity #3 (suggested)

Macroinvertebrates

Macrovinvertebrates that have a low tolerance to water pollution will not live in water that is not healthy, while those with a moderate tolerance will live if the water has some pollution, and those with a high tolerance can live with a high level of pollution. If the water has only high tolerance macroinvertebrates this indicates your creek or pond is unhealthy. If all these macroinvertebrates are found the water is healthy.

Low Tolerance

Mayfly

Stonefly

Dobsonfly

Caddisflies

Moderate Tolerance

Damselfly

Cranefly

Alderfly

Horsefly

High Tolerance

Black fly

Crayfish

Mosquito

Midge

Creek Critters

As discussed in Pre-Visit Activity #3, macroinvertebrates are aquatic insects that live in the water. Each one has a different tolerance to water pollution. Testing for macroinvertebrates is relatively easy because it requires few people and inexpensive gear. Sampling also has a minimal detrimental effect on the resident biota.

Macroinvertebrate testing is also good because macroinvertebrates do not move much. They are also very sensitive to change and the sampling results are easy to interpret.

Students, with the help a park ranger, will take a sampling of Cub Creek or Graff pond at Homestead National Monument of America. By examining the macroinvertebrates in the sample, students will be able to determine the health of the creek or pond.

Using Creek Critters to Determine the Quality of the Water

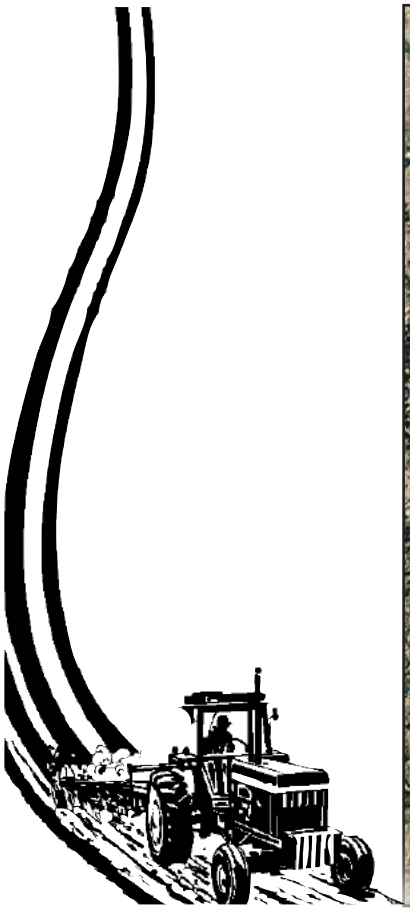
Allow students to discuss the importance of grassland to water quality and the water cycle.

- How would the environment at Homestead be different if the land was still farmed?
- How would it affect the water cycle?

Write a short report about homesteaders and the water cycle.

Potential topics:

- What ONE thing did homesteaders do that was most damaging to the water cycle?
- What was the best thing that they did?
- Which implement or invention changed the water cycle the most (for better or worse)?



CHARACTER EDUCATION

Caring

Students who practice good citizenship are motivated by more than self-interest and greed. They are genuinely concerned for the needs of others. They recognize their duty to contribute to making life better at home, at school, in the neighborhood, and for the whole planet.

5 Minute Focus

Water quality testing is done on a regular basis in many areas to help monitor water pollution.

- What can you do to help prevent water pollution?
- How does your family help prevent water pollution?

ADDITIONAL RESOURCES

Website - http://www.epa.gov/safewater/kids/flash/flash_watercycle.html Thirstin is the EPA's mascot for water quality. This flash site takes 4-5 minutes to explain the water cycle.

Website - http://techalive.mtu.edu/meec/module01/title.htm Interactive flash site that illustrates the water cycle. Students can select the amounts of rainfall, the size of particles in the soil, work with maps, and a host of other things to manipulate water quality.

Website - http://www.bellmuseum.org/distancelearning/watershed/watershed2.html The intermediate level of this game is appropriate to 3-5 graders, as they are asked to make decisions affecting water quality that must be balanced with other concerns.

Water Quality Vocabulary

Alkalinity: Is a measure of the ability of a solution to neutralize acids to the equivalence point of carbonate or bicarbonate.

Biotic index: Is a scale for showing the quality of an environment by indicating the types of organisms present in it.

Condensation: The process by which a gas or vapor changes to a liquid or solid.

Evaporation: (1) The physical process by which a liquid (or a solid) is transformed to the gaseous state. (2) Process in which water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapor.

Groundwater: (1) Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. (2) Water stored underground in rock crevices and in the pores of geologic materials that make up the Earth's crust.

Hydrologic cycle: The cyclic transfer of water vapor from Earth's surface via evapotranspiration into the atmosphere, from the atmosphere via precipitation back to Earth, and through runoff into streams, rivers, and lakes, and ultimately into the oceans.

Infiltration: Water soaking into the ground.

Permeable: A substance which passes water easily.

Precipitation: Water from the atmosphere that falls to the ground as rain, snow or sleet, or hail.

Runoff: Water from precipitation that is not absorbed but flows over the land, carrying sediment and other materials to streams, lakes and other bodies of water.

Surface water: Water that is on Earth's surface, such as in a stream, river, lake or reservoir.

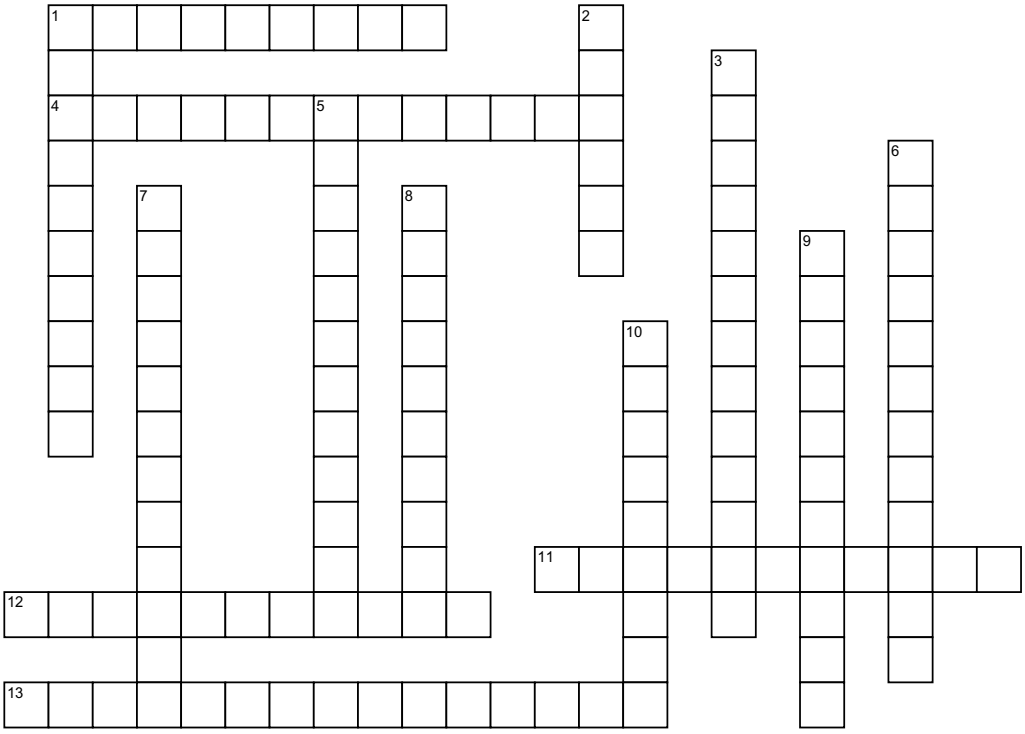
Transpiration: The giving off of water by plants.

Water Cycle: The path water takes through its various states-gas, liquid, and solid-as it moves through-out Earth's systems (oceans, atmosphere, ground water, streams, etc.); also known as the hydrologic cycle.

Watershed: The land area over which water drains into a particular stream, river or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge.

Water table: The uppermost level of water in the saturated part of an aquifer.

Water Quality



ACROSS

1 The land area over which water drains into a particular stream, river or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge.

4 The giving off of water by plants.

11 (1) The physical process by which a liquid (or a solid) is transformed to the gaseous state. (2) Process in which water from land areas, bodies of water, and all other moist surfaces is absorbed into the atmosphere as a vapor.

12 Is a scale for showing the quality of an environment by indicating the types of organisms present in it.

13 The cyclic transfer of water vapor from Earth's surface via evapotranspiration into the atmosphere, from the atmosphere via precipitation back to Earth, and through runoff into streams, rivers, and lakes, and ultimately into the oceans.

DOWN

1 The uppermost level of water in the saturated part of an aquifer.

2 Water from precipitation that is not absorbed but flows over the land, carrying sediment and other materials to streams, lakes and other bodies of water.

3 Water from the atmosphere that falls to the ground as rain, snow or sleet, or hail.

5 Water soaking into the ground.

6 The process by which a gas or vapor changes to a liquid or solid.

7 Water that is on Earth's surface, such as in a stream, river, lake or reservoir.

8 The path water takes through its various states-gas, liquid, and solid-as it moves through-out Earth's systems (oceans, atmosphere, ground water, streams, etc.); also known as the hydrologic cycle.

9 (1) Water that flows or seeps downward and saturates soil or rock, supplying springs and wells. (2) Water stored underground in rock crevices and in the pores of geologic materials that make up Earth's crust.

10 A substance which passes water easily.

Water Quality

Solution: