Young Naturalists

Teachers Guide

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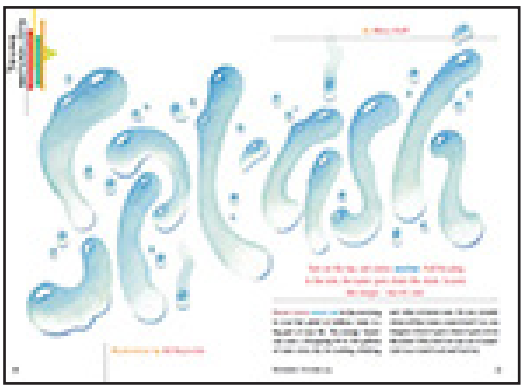
"Splash" Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article "Splash" by Mary Hoff, with illustrations by Bill Reynolds. Published in the September–October 2013 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/splash.



Young Naturalists teachers guides are provided free of charge to classroom teachers, parents, and students. This guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards applications, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources (including related Minnesota Conservation Volunteer *articles), copy-ready study questions with answer key, and a copy-ready vocabulary sheet and vocabulary study cards. There is also a practice quiz (with answer key) in Minnesota Comprehensive Assessments format. Materials may be reproduced and/or modified to suit user needs. Users are encouraged to provide feedback through an online survey at www.mndnr.gov/education/teachers/activities/ynstudyguides/survey.html.*

***All *Minnesota Conservation Volunteer* articles published since 1940 are now online in searchable PDF format. Visit *www.mndnr.gov/magazine* and click on *past issues*.**

Summary

"Splash" begins with a brief description of the natural water cycle. Readers are then walked, step-by-step, through the technology of rural and urban domestic water systems. The article concludes with water conservation strategies in pictures and words. **Note: "Splash" connects especially well with fourth and eighth grade earth and space science standards for the water cycle and human interaction with it.**

Suggested reading levels:	Third through middle school grades
Total words:	1,632
Materials:	"The Wonder of Water" Young Naturalists article (See Related Reading); free materials from the Minnesota Department of Health on the hydrologic cycle, drinking water, and water contamination (See Web Resources); paper, poster board, colored pencils, crayons, pens, markers; print and online resources your media specialist may provide
Preparation time:	One to two hours, not including time for extension activities

Estimated instructional time:

One or two 50-minute class periods (not including extensions)

Minnesota Academic Standards applications:

"Splash" may be applied to the following Minnesota Department of Education standards:

Language Arts
Reading Benchmarks
Informational Text 3–8
- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

Writing Benchmarks 3–8
- Text Types and Purposes
- Writing Process
- Research to Build and Present Knowledge
- Range of Writing

Reading Benchmarks: Literacy in Science and Technical Subjects 6–8
- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

Writing Benchmarks: Literacy in History/Social Studies, Science and Technical Subjects 6–8
- Text Types and Purposes
- Writing Process: Production and Distribution of Writing
- Research to Build and Present Knowledge
- Range of Writing

Science
Grades 4, 5, and 7
- Life Science
  5.4.2.1.2; 5.4.4.1.1; 7.4.2.1.2; 7.4.2.1.3;
- The Nature and Science of Engineering
  4.1.2.1.1; 6.1.2.1.1; 6.1.3.1.1; 8.1.3.3.3;
- Earth and Space Science
  4.3.2.3.1; 4.3.4.1.1; 5.3.4.1.3; 8.3.2.1.3; 8.3.2.3.1; 8.3.2.3.2; 8.3.4.1.2
- Physical Science
  6.2.1.2.1; 6.2.1.2.3

Arts
Grades K–12
- 1. Artistic Foundations: Visual Arts
- 2. Artistic Process: Create or Make: Visual Arts
- 3. Artistic Process: Perform or Present: Visual Arts
- 4. Artistic Process: Respond or Critique: Visual Arts

Current, complete Minnesota Academic Standards are available at *www.education.state.mn.us*. Teachers who find other connections to standards are encouraged to contact *Minnesota Conservation Volunteer*.

Preview

(1) Ask students to preview the illustrations in "Splash." Follow with class discussion of water and water use. Ask students to predict what they will learn from the article. (2) Another preview strategy is **KWL** (Ogle, 1986). To find out what your students already know (**K**) about water, water use, the water cycle, and water treatment, ask small groups to brainstorm their ideas. Then combine the groups' data to make a class list. Repeat step one by asking what students would like to learn (**W**). As you read and discuss the article you will begin to compile the (**L**) list, or what they learn while reading the article and related materials and participating in extension activities. Display your **K** and **W** ideas on poster board or paper. See www.teach-nology.com/web_tools/graphic_org/kwl for a KWL generator that will produce individual organizers for your students. KWL gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. If you use the article in math or art class, you may wish to focus your prereading discussion on academic standards that apply for that class. (3) You may access prior knowledge with a brainstorming web. You may download a printable web at www.teachervision.fen.com/tv/printables/TCR/0743932080_007.pdf.

Vocabulary preview

See the copy-ready vocabulary list included in this guide. You may wish to modify the list based on your knowledge of your students' needs or the subject you are teaching. Pretesting vocabulary individually, in small groups, or with your entire class can be an effective vocabulary preview strategy. You may then post-test at the conclusion of this activity (see Assessment section below). Italicized words are not generally included on the list or in the study cards. Pay particular attention to italicized words, most of which are defined within the article.

You may wish to use the study cards found at the end of this guide. Cut along the horizontal line, fold in the middle, and tape or staple. Study cards (see *Strategic Tutoring*, Hock, Deshler, and Schumaker 2000) can be applied to any subject area. On one side of the card, in large letters, write a key word or phrase students are expected to know. In smaller letters, frame the word or phrase in a question or statement. On the other side of the card, in large letters, write the answer to the question. Finally, in smaller letters, frame the answer in a question or statement. Blanks are provided to allow you or your students to add new words or phrases.

Study questions overview

Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). **Preview the questions with your class before you read the article.** You may wish to read the story aloud and complete the study questions in class, in small groups, or as an independent activity. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations section). The study questions may be also used as a quiz. Note: Some items simply require finding the answer. Items with an asterisk require varying degrees of critical thinking.

Adaptations

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first. If time allows, remaining items may be attempted. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the study questions. With close teacher supervision, cooperative groups can also offer effective support to special needs students, especially for extension activities.

Assessment

You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Students may compare and contrast self-contained systems most often used in rural residences and businesses with urban water systems. See compare and contrast tools in Web resources. (2) Students may write

Assessment continued

multiple-choice, true-false, or short-answer questions. Select the best items for a class quiz. (3) Students may write essays on a main idea, such as the water cycle, country water, or city water. (4) Poster presentations may supplement or take the place of essays. Students may work in small groups with each group focusing on a main idea from the article.

Extension activities

1. "The Wonder of Water," also by Mary Hoff, is an excellent companion piece for "Splash." See Related Articles for link.
2. Schedule a visit to your local water treatment/waste treatment facility. Your students will be amazed at what they see (and smell). Most public water/waste facilities welcome visitors. The U.S. Environmental Protection Agency offers a virtual tour of a water treatment plant on its website, and the Minnesota Department of Health and Minnesota Pollution Control Agency offer online resources you can use in conjunction with your field trip. See Web Resources for links.
3. The Clean Water Act was landmark legislation when it passed in 1972. Challenge your students to connect the consequences of the act with current water use/pollution issues. See Web Resources for links.
4. The availability of fresh water resources around the world is a limiting factor for human development. See the NASA website under "Web Resources" for a classroom activity that will help your students understand just how precious fresh water is.
5. The Minnesota Pollution Control Agency is our state's primary protector of environmental quality. Explore the MPCA website (www.pca.state.mn.us) for water-related information, including the link to EPA's Safe Drinking Water Query.
6. Analyze your school's water use and develop a plan to conserve water. The water conservation links below will help you get started.

Web resources

DNR
www.dnr.state.mn.us/healthyrivers/index.html
www.dnr.state.mn.us/adoptriver/index.html
www.dnr.state.mn.us/waters/index.html

Minnesota Pollution Control Agency
www.pca.state.mn.us/index.php/water/index.html
www.pca.state.mn.us/index.php/living-green/living-green-citizen/for-kids/student-guide-to-environmental-information.html
www.pca.state.mn.us/index.php/about-mpca/mpca-news/featured-stories/new-law-aims-to-increase-accountability-for-clean-water.html

Domestic water
ga.water.usgs.gov/edu/wudo.html

Water conservation
www.csa.com/discoveryguides/water/overview.php
wateruseitwisely.com/100-ways-to-conserve/
www.epa.gov/oaintrnt/water/

Water towers
www.howstuffworks.com/water.htm

Web resources continued

Minnesota Department of Health
www.health.state.mn.us/divs/eh/wells/index.html
www.health.state.mn.us/divs/eh/water/index.html

Water treatment
water.epa.gov/learn/kids/drinkingwater/watertreatmentplant_index.cfm
water.epa.gov/learn/kids/drinkingwater/gamesandactivities.cfm
water.epa.gov/drink/tour/index.cfm (virtual tour of water treatment plant)
www2.epa.gov/nutrientpollution/problem

Clean Water Act
www.epa.gov/agriculture/lcwa.html
water.epa.gov/action/cleanwater40/
www.eoearth.org/view/article/151133/

Freshwater resources
www.globalchange.umich.edu/globalchange2/current/lectures/freshwater_supply/freshwater.html
www.unwater.org/statistics_res.html
ga.water.usgs.gov/edu/earthwherewater.html
pmm.nasa.gov/education/browse?type=lesson_plan (classroom activity)

Compare and contrast
www.readwritethink.org/files/resources/interactives/compcontrast/
www.manatee.k12.fl.us/sites/elementary/samoset/rcccon1.htm
www.readingquest.org/strat/compare.html

Minnesota DNR teacher resources
www.mndnr.gov/education/teachers/index.html
www.mndnr.gov/dnrkids/index.html

*Note: All websites were active at the time of this guide's publication. However, some may no longer be active when this guide is accessed.

Related Articles

In addition to the related YN articles listed below, every Minnesota Conservation Volunteer article published since 1940 is now online in searchable PDF. See webapps8.dnr.state.mn.us/volunteer_index.

March–April 1990
"Ten Ways to Save Minnesota's Wetlands"
webapps8.dnr.state.mn.us/volunteer_index/past_issues/article_pdf?id=1466

May–June 1991
"A River is a Watershed"
webapps8.dnr.state.mn.us/volunteer_index/past_issues/article_pdf?id=92

January–February 1995
"Wastewater Woes"
webapps8.dnr.state.mn.us/volunteer_index/past_issues/article_pdf?id=1781

Related Articles

July–August 2000
"Muscle Bound in Minnesota" (Young Naturalists article)
www.dnr.state.mn.us/young_naturalists/mussels/index.html

July–August 2005
"The Wonder of Water" (Young Naturalists article with teachers guide)
www.dnr.state.mn.us/young_naturalists/water/index.html

March–April 2008
"Gauging Groundwater"
webapps8.dnr.state.mn.us/volunteer_index/past_issues/article_pdf?id=3590

July–August 2008
"A Most Amazing River" (Young Naturalists article with teachers guide)
www.dnr.state.mn.us/young_naturalists/mississippi/index.html

March–April 2010
"Water Opinions"
webapps8.dnr.state.mn.us/volunteer_index/past_issues/article_pdf?id=5488

References

Hock, M.F., Deshler, D.D., and Schumaker, J.B. *Strategic Tutoring*. Lawrence, Kan.: Edge Enterprises, 2000.
Ogle, D.S. K-W-L Group Instructional Strategy. In A.S. Palincsar, D.S. Ogle, B.F. Jones, and E.G. Carr (Eds.), *Teaching Reading as Thinking: Teleconference Resource* Guide, pp.11–17. Alexandria, Va.: Association for Supervision and Curriculum Development, 1986.

Study Questions

Teachers guide for the Young Naturalists article "Splash" by Mary Hoff, with illustrations by Bill Reynolds. Published in the September–October 2013 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/splash.

Name_____Period _____ Date_____

1. You and everyone in your family use about _____ to _____ gallons of fresh water every day.

2. Most of the water in Minnesota's lakes, wetlands, streams, rivers, and aquifers arrives in the form of _____ or _____.

3. The illustration on page 35 depicts the natural water cycle. Describe the water cycle in your own words.

_____

_____

_____

_____

_____

4. True or false? Most of Minnesota's water is found in lakes. True False

5. Explain why water is necessary for all plants and animals. _____

_____

6. Is water more important to aquatic or nonaquatic plants and animals? Explain your answer.

_____

_____

_____

7. What is the purpose of a septic system? _____

_____

8. Number the following in the correct sequence:

_____ Water flows out of a faucet.

_____ An electric pump is attached to the well pipe.

_____ A well is drilled to tap water from an aquifer.

_____ A pressure tank fills pipes with water.

_____ A pump draws water from the well into a pressure tank.

9. Minneapolis and St. Paul get their water from _____

10. Draw lines to connect the terms in the left hand column with its matching term in the right hand column:

water main	process for cleaning water
fluoride	clumps of dirt particles
drinking water treatment	kills germs in the water
chloride	large pipe
floc	stores clean water
water tower	helps prevent tooth decay

11. What force of nature moves clean water from a water tower to your home? _____

12. Write the following terms in the correct column:
septic tank - sewer - wastewater treatment plant - drain field -
distribution box -13-foot-diameter pipes - millions of gallons per day - hundreds of gallons per day

Rural Waste	Urban Waste
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

13. What is a "natural filter," and how does it work? _____

_____

_____

14. Select an example of water conservation from page 40. Explain how your example saves fresh water.
Example: _____
How it saves water: _____

_____

15. What does the third example on page 41 mean? _____

_____

_____

Challenge: How may air pollution be related to water pollution? _____

_____

_____

_____

_____

Study Questions Answer Key

Teachers guide for the Young Naturalists article "Splash" by Mary Hoff, with illustrations by Bill Reynolds. Published in the September–October 2013 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/splash.

1. You and everyone in your family use about **80** to **100** gallons of fresh water every day.

2. Most of the water in Minnesota's lakes, wetlands, streams, rivers, and aquifers arrives in the form of **rain or snow**.

*3. The illustration on page 35 depicts the natural water cycle. Describe the water cycle in your own words. **Answers may vary. The big idea is the unbroken sequence of precipitation, runoff/infiltration, and evapotranspiration/evaporation.**

4. True or false? Most of Minnesota's water is found in lakes. True **False**

5. Explain why water is necessary for all plants and animals. **Animals need water to transport nutrients, energy and oxygen to every part of their bodies, and to flush wastes from their bodies. Plants need water to transport food from roots to shoots. For aquatic plants and animals water is an essential part of their habitats.**

*6. Is water more important to aquatic or non aquatic plants and animals? Explain your answer. **Answers will vary. Encourage creativity.**

7. What is the purpose of a septic system? **A septic system returns wastewater from a rural home or business to the ground.**

*8. Number the following in the correct sequence:

5 Water flows out of a faucet.

2 An electric pump is attached to the well pipe.

1 A well is drilled to tap water from an aquifer.

4 A pressure tank fills pipes with water.

3 A pump draws water from the well into a pressure tank.

9. Minneapolis and St. Paul get their water from **the Mississippi River.**

*10. City water system match. Draw lines to connect the terms in the left hand column with its matching term in the right hand column:

water main - **large pipe**

fluoride - **helps prevent tooth decay**

drinking water treatment - **process for cleaning water**

chloride - **kills germs in the water**

floc - **clumps of dirt particles**

water tower - **stores clean water**

11. What force of nature moves clean water from a water tower to your home? **gravity**

*12. Write the following terms in the correct column:

Rural Waste: **septic tank, drain field, distribution box, hundreds of gallons per day**

Urban Waste: **wastewater treatment plant, sewer, 13-foot-diameter pipes, millions of gallons per day**

13. What is a "natural filter," and how does it work? **A natural filter is a wetland that collects runoff and removes soil and nutrients, or porous sand and gravel that filters pollutants as water flows toward the aquifer.**

*14. Select an example of water conservation from page 40. Explain how your example saves fresh water. Example: **Answers will vary.**

How it saves water: **Answers will vary.**

*15. What does the third example on page 41 mean? **Do not pour medicine down the drain.**

Challenge*: How may air pollution be related to water pollution? **Refer to the water cycle. Pollutants, such as mercury from coal-fired power plants, fall to Earth in rain and snow.

Minnesota Comprehensive Assessments Practice Items

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Name _____Period _____Date_____

1. To conserve fresh water use in your home you can
   A. chill drinking water in the refrigerator.
   B. use a rain barrel to collect water for your garden.
   C. take a shower instead of a bath.
D. do all of the above.

2. What is a distribution box?
   A. A distribution box sends messages to the septic tank.
   B. A distribution box sends water to pipes in the drain field.
   C. A distribution box sends water to the septic tank.
   D. None of the above

3. Sand and gravel are _____ filters.
   A. carbon
   B. active
   C. biological
   D. natural

4. Describe how a country water system works. _____
   _____
   _____
   _____
   _____

5. An aquifer is found
   A. far underground.
   B. in cumulus clouds.
   C. in large coolers.
   D. at the bottom of deep lakes.

Minnesota Comprehensive Assessments Answer Key

Teachers guide for the Young Naturalists article "Splash" by Mary Hoff, with illustrations by Bill Reynolds. Published in the September–October 2013 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/splash.

1. To conserve fresh water use in your home you can **D. do all of the above.**
2. What is a distribution box? **B. A distribution box sends water to pipes in the drain field.**
3. Sand and gravel are **D. natural filters.**
4. Describe how a country water system works. **There are three main components of a rural water system: a well, a pump, and a pressure tank. The pump draws water from the well into the pressure tank. Pressure from the tank pushes water through pipes in the house and out the faucets.**
5. An aquifer is found **A. far underground.**

Vocabulary

Teachers guide for the Young Naturalists article "Splash" by Mary Hoff, with illustrations by Bill Reynolds. Published in the September–October 2013 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/splash.

aquatic	living in or near water
chlorine	chemical derived from salt, used in water treatment to prevent waterborne diseases
condensation	change from gas to liquid state
diameter	length of a line through the center of a circle
evaporation	process whereby water changes from liquid to vapor
evapotranspiration	sum of evaporation from Earth's surface from the soil and plants
fluoride	salt compound added to drinking water to help prevent tooth decay
gravity	natural force that gives weight to objects with mass and causes them to fall to the ground
habitat	home environment of a plant or animal
infiltration	when water from precipitation or snowmelt enters the soil
nutrients	chemicals that plants and animals need to live and grow
runoff	precipitation and snowmelt not absorbed by the soil
water cycle	(hydrologic cycle or the H_2O cycle) the continuous movement of water on, above and below the surface of Earth

What are **aquatic organisms?**	FOLD HERE	**Organisms that live in or near water** are
What is **chlorine?**	FOLD HERE	**A chemical derived from salt, used in water treatment to prevent waterborne diseases,** is
Condensation is	FOLD HERE	**To change from a gas to a liquid state** is
The **diameter** of a circle is the	FOLD HERE	The **length of a line through the center of a circle** is its
What is **evaporation?**	FOLD HERE	**The process whereby water changes from liquid to vapor** is called

Evapotranspiration is the sum of	The sum of **evaporation from Earth's surface from the soil and plants** is
What is **fluoride?**	**A salt compound added to drinking water to help prevent tooth decay** is called
What is **gravity?**	**A natural force that gives weight to objects with mass and causes them to fall to the ground** is called
What is a **habitat?**	**The home environment of a plant or animal** is its
Water **infiltration** happens when	When **water from precipitation or snowmelt enters the soil** it is called

FOLD HERE

What are **nutrients?**	**Chemicals that plants and animals need to live and grow** are called
What is **runoff?**	**Precipitation and snowmelt not absorbed by the soil** is called
The **water cycle** is	**The continuous movement of water on, above, and below the surface of Earth** is the

FOLD HERE

FOLD HERE

FOLD HERE

FOLD HERE