Young Naturalists

Teachers Guide

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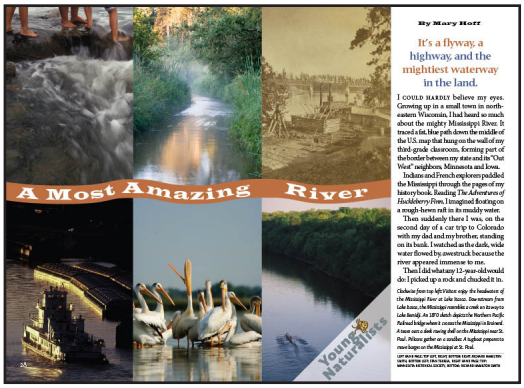
"A Most Amazing River" Multidisciplinary Classroom Activities

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi



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 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.*

Summary

"A Most Amazing River" tells the story of the first 600 miles of the Mississippi River in natural and human history, as it winds its way from its source in Lake Itasca through Bemidji, Brainerd, St. Cloud, and the Twin Cities on its way to New Orleans. Topics include the Mississippi's geography, geologic history, plant and animal life, Native American history, European exploration and commercial development, ecological threats, and points of interest along the Minnesota stretch of the river.

Suggested reading levels: Upper elementary through high school grades

Total words: 2,157

Materials: Paper, poster board, pencils, pens, markers, and print resources from your media center as well as Web sites, blank map of Minnesota (www.50states.com/maps/minnesota.htm)

Preparation time: One to two hours, not including time for extension activities

Estimated instructional time: Two to three 50-minute class periods (not including extensions)

Minnesota Academic Standards applications: "A Most Amazing River" may be applied to the following Minnesota Department of Education standards:

I. Reading and Literature
A. Word Recognition, Analysis and Fluency
B. Vocabulary Expansion
C. Comprehension

II. Writing
A. Types of Writing
B. Elements of Composition
C. Spelling
D. Research
E. Handwriting and Word Processing

III. Speaking, Listening, and Viewing
A. Speaking and Listening
B. Media Literacy

Science
Grade 4

IV. Life Science
B. Diversity of Organisms
Grades 5, 8, and 9–12

III. Earth and Space Science
A. Earth Structure and Processes

IV. Life Science
F. Flow of Matter and Energy
Grades 7

IV. Life Science
B. Diversity of Organisms
C. Interdependence of Life
F. Flow of Matter and Energy

Social Studies
Grades 4–8

II. Minnesota History
A. Pre-contact to 1650: The student will demonstrate knowledge of Minnesota's indigenous peoples.
B. Contact and Fur Trade 1600–1810: The student will demonstrate knowledge of early explorers and fur traders in Minnesota and the impact of the fur trade on both European and Native societies.
C. Early settlement and statehood 1810–1860: The student will know and understand the factors that led to rapid settlement of Minnesota in the 19th century and the changes the new Minnesotans brought with them.
E. Industrial Era 1865–1914: The student will know and understand Minnesota's major industries and economic, social, political, and technological changes that accompanied industrialization.

V. Geography
B. Maps and Globes: The student will make and use maps to acquire, process, and report on the spatial organization of people and places on Earth.
D. Interconnections: The student will describe how humans influence the environment and in turn are influenced by it.
E. Essential Skills: The student will use maps, globes, geographic information systems, and other sources of information to analyze the natures of places at a variety of scales.

Arts
All grades
Artistic Expression
D. Visual Arts

Minnesota Academic Standards applications continued:

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

Preview

Before you read, ask students to survey the article. Examine the photos and map. Use the **KWL** strategy (Ogle, 1986) to find out what your students already know **(K)** about the Mississippi, what **(W)** they would like to learn, and eventually what they learned **(L)** while reading the article and related materials, and through participating in extension activities. You might begin by asking small groups to brainstorm their ideas about the Mississippi. Then combine the groups' data to make a class list. Display your **K** and **W** ideas on poster board or paper (see Vocabulary Preview). Add to your L list as you read and discuss the article. See www.teach-nology.com/web_tools/graphic_org/kwl for a KWL generator that will produce individual organizers for your students. Individual organizers may be useful as students read the article for answers to W questions. KWL also gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. For example, if you plan to use the article during social studies, science, or art, you may ask students to review their KWL for concepts that are specific to those disciplines.

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. 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).

Connections to vocabulary in the article may also be made during KWL. If students are not familiar with some of the terms, include them in the **W** list. Other terms may be added to the **W** list as students read the article. Eventually they can be moved to the **L** list. You may write vocabulary from the article in green ink, while other ideas are written in black. Notes: Some of the words in the vocabulary list definitions may require further explanation. Also, preview the study questions for unfamiliar terms.

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 that 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 entire guide 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: Items 3, 6, 9, 11, 12, 15, 16, and the Challenge require varying degrees of analytical thinking.

Adaptations

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first, for example, items 1, 5, 10, 13, and 14. 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 write an essay describing either a self-selected or teacher-assigned topic from the article's 11 sections. (2) Students may write a story in journal form of an imagined raft trip from Itasca to the Iowa border. (3) Students may, on a map of Minnesota, illustrate the route of the Mississippi with the cities the river sustains. (4) Poster presentations may describe one or more of the many plants and animals that depend on the river.

Extension activities

1. Investigate one or more environmental issues associated with the Mississippi and/or rivers in general. See Web sites below.
2. Invite a DNR fisheries biologist (www.mndnr.gov/areas/fisheries/index.html) to your classroom.
3. Visit one of Minnesota's state parks located on the Mississippi or other rivers (www.mndnr.gov/state_parks/list.html). Park naturalists are eager to work with teachers on activities and presentations that connect with your curriculum.
4. Encourage students to explore more deeply the rich history of the Mississippi: the indigenous people who first lived along its banks, the early explorers, the fur trade, and the development of locks and dams.
5. To help students understand the relationship of topography to the Mississippi watershed, build a three-dimensional map of Minnesota (See www.ucmp.berkeley.edu/fosrec/Metzger1.html.)
6. Students may design a travel brochure for visitors to the Mississippi watershed. What would they recommend visitors see? Most word processing programs offer two- or three-column formats that work well for brochures.
7. Ask students to list and categorize the animals mentioned in this article. Poster sessions on threatened species combine research skills, as well as visual art, writing, speaking, listening, and viewing.

Web resources

Mississippi River
www.nps.gov/miss
en.wikipedia.org/wiki/Mississippi_River
www.smm.org/visit/mississippi
www.gatewayno.com/history/Mississippi.html
www.experiencemississippiriver.com/minnesota-along.cfm

Itasca State Park
www.mndnr.gov/state_parks/itasca/index.html

Natural history
www.greatriver.com/Ice_Age/glacier.htm

Web resources

Invasive species
www.umesc.usgs.gov/reports_publications/psrs/psr_2000_05.html
wwwaux.cerc.cr.usgs.gov/micra/PC%20AIS%20Control%20Methods%20Final.htm

Early explorers
www.enchantedlearning.com/explorers/1600.shtml
library.thinkquest.org/CR0215480/marqjoll.htm
www.mndnr.gov/state_parks/schoolcraft/narrative.html

Environmental connections
www.pbs.org/journeytoplanetearth/education/riversofdestiny.html
www.msnbc.msn.com/id/21321821/
www.onerivermississippi.org/eco/environissues.html

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

Related articles

Many related *Minnesota Conservation Volunteer* articles are available online at www.mndnr.gov/volunteer/articles/index.html, including:

July–August 2000
"Mussel Bound in Minnesota"
www.mndnr.gov/young_naturalists/mussels/index.html

September–October 2002
"Mississippi Yields Record Turtle"
www.mndnr.gov/volunteer/sepoct02/turtles.html

November–December 2004
"Fishing for a Living"
www.mndnr.gov/volunteer/novdec04/fishing.html

July–August 2005
"Snapshot: Itasca State Park"
http://www.mndnr.gov/volunteer/julaug05/snapshot.html

September–October 2007
"Cult of the Midnight Catfish"
www.mndnr.gov/volunteer/sepoct07/midnight_catfish.html

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 "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

Name_____Period_____Date_____

1. The Mississippi River flows through _____ states.

2.In Minnesota more than _____ people get their drinking water from the Mississippi.

3. When and how was the Mississippi River formed? _____

_____

_____

4. What other major river joins the Mississippi in St. Paul? _____

_____

_____

5. The source of the Mississippi River is found in _____ .

6. How does farming affect the river? _____

_____

_____

7. Why is the Mississippi so important to migrating birds? _____

_____

_____

8. Where is Lake Pepin? What popular sport was invented there?_____

_____

9. What else is Lake Pepin famous for? _____

_____

10. The Ojibwe word *Misi-ziibi* means _____

_____

11. After the Europeans arrived, what role did the Mississippi play in Minnesota's development? _____

_____

_____

_____

12. How did locks and dams change the river? _____

_____

13. What does the Mississippi have to do with electricity? _____

_____

_____

14. What do all the cities on the Mississippi on Minnesota have in common? _____

_____

_____

15. Name two environmental threats to the health of the Mississippi. _____

_____

16. Of the many interesting sights along the Mississippi, which would you recommend and why? _____

_____

_____

Challenge: If the Mississippi is 2,320 miles long from its source in northern Minnesota to its mouth in New Orleans, about what percent of its length is in Minnesota? _____

Study Questions Answer Key

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

1. The Mississippi River flows through **10** states.

2. In Minnesota more than **1 million** people get their drinking water from the Mississippi.

3. When and how was the Mississippi River formed? **Answers will vary, but should include details about glacial runoff 12, 000 years ago, the Minnesota River affecting flow south of St. Paul, and later glacial runoff in combination with sand and gravel wash.**

4. What other major river joins the Mississippi in St. Paul? **The Minnesota**

5. The source of the Mississippi River is found in **Lake Itasca**.

6. How does farming affect the river? **Answers may vary. Silt and chemicals from farm fields washes into the river, causing water pollution.**

7. Why is the Mississippi so important to migrating birds? **Forty percent of all migrating birds in the United States use the Mississippi to guide their flight**.

8. Where is Lake Pepin? What popular sport was invented there? **Lake Pepin is a widening of the Mississippi south of Red Wing. Water skiing was invented there in 1922**.

9. What else is Lake Pepin famous for? **Lake Pepin is famous for producing big fish. Eleven state record fish have been caught there**.

10. The Ojibwe word Misi-ziibi means **Great River**.

11. After the Europeans arrived what role did the Mississippi play in Minnesota's development?

Answers will vary, but should include details about transporting logs from north-central pine forests to sawmills in Minneapolis, transporting settlers from the south, transporting farm products and other goods, producing electric power, and providing water for drinking and industry.

12. How did locks and dams change the river? **Lock and dams made it possible for larger boats to come up river**.

13. What does the Mississippi have to do with electricity? **There are 10 hydroelectric dams on the Mississippi in Minnesota**.

14. What do all the cities on the Mississippi on Minnesota have in common? **Every Minnesota city on the Mississippi sends its wastewater into the river**.

15. Name two environmental threats to the health of the Mississippi. **Answers will vary, but should include at least two of the following: dams prevent fish from moving freely and water from reaching its natural seasonal levels, which negatively affects plants and animals that live along the river; invasive species compete with native plants and animals; pollution from cities and farms harms fish and other aquatic animals; a growing population along the river means more demand for water and greater waste discharge and runoff**.

16. Of the many interesting sights along the Mississippi which would you recommend and why? **See pages 38–39 for descriptions of nine points of interest along the river.**

Challenge: If the Mississippi is 2,320 miles long from its source in northern Minnesota to its mouth in New Orleans, about what percent of its length is in Minnesota? **About 25%**

Minnesota Comprehensive Assessments Practice Items

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Name _____Period _____Date_____

1. What is Great River Bluffs State Park famous for?
   A. Schoolcraft's birthplace
   B. American Indian burial mounds
   C. The source of the Minnesota River
   D. None of the above.

2. What is the farthest distance most Minnesotans have to drive to get to the Mississippi River?

_____

3. The author of this story was impressed by how _____ the Mississippi River was.
   A. narrow
   B. shallow
   C. large
   D. polluted

4. How do migrating birds use the Mississippi to navigate? _____

_____

_____

5. Wing dams were built to_____ .
   A. Help migrating salmon get to their spawning grounds.
   B. Keep navigation channels open for big boats.
   C. give migrating birds a place to rest.
   D. provide a good place for people to fish.

Minnesota Comprehensive Assessments Answer Key

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

1. What is Great River Bluffs State Park famous for? **B. American Indian burial mounds**
2. What is the farthest distance most Minnesotans have to drive to get to the Mississippi River? **60 miles**
3. The author of this story was impressed by how **C. large the Mississippi River was.**
4. How do migrating birds use the Mississippi to navigate? **They follow the Mississippi as a landmark.**
5. Wing dams were built to **B. Keep navigation channels open for big boats.**

Vocabulary

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

anglers	people who fish with a hook and line for sport
bedrock	solid rock beneath soil and gravel
commercial fishermen	people who fish with nets for profit
geological	refers to the structure of the earth, especially its rocks and minerals
glacial episodes	periods of time when glaciers advanced and retreated
habitat	natural conditions in which a plant or animal lives
river channel	deepest part of the river, where boats may travel safely
rough-hewn	cut to a rough finish; rough-hewn timbers have a rough surface
sedges	wetland grasslike plants with a triangular stem
sediment	material that settles to the bottom of lakes or rivers
silt	fine-grained sediment, especially clay, suspended in water or settled to the bottom of lakes or rivers
wing dams	dams angled from the shore to direct fast-moving water into the channel

Vocabulary Study Cards

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

Who are **anglers**?	FOLD HERE	What are **people who fish with a hook and line for sport** called?
What is **bedrock**?	FOLD HERE	What is **solid rock beneath soil and gravel** called?
Who are **commercial fishermen**?	FOLD HERE	What are **people who fish with nets for profit** called?

Vocabulary Study Cards

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Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

The word **geological** refers to	FOLD HERE	A word that refers to **the structure of the earth, especially its rocks and minerals** is
What are **glacial episodes**?	FOLD HERE	What are **periods of time when glaciers advanced and retreated** called?
A plant or animal's **habitat** is the	FOLD HERE	The **natural conditions in which a plant or animal lives** is called its

Vocabulary Study Cards

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Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

The **river channel** is the	FOLD HERE	The **deepest part of the river, where boats may travel safely** is called the
A **rough-hewn** surface is	FOLD HERE	A surface that is **cut to a rough finish** is
What are **sedges?**	FOLD HERE	What are **wetland grasslike plants with a triangular stem** called?

Vocabulary Study Cards

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

In rivers, **sediment** is	FOLD HERE	**Material that settles to the bottom** of rivers is called
What is **silt**?	FOLD HERE	**Fine-grained sediment, especially clay, suspended in water or settled to the bottom of lakes or rivers** is called
What are **wing dams**?	FOLD HERE	**Dams angled from the shore to direct fast-moving water into the channel** are called

Vocabulary Study Cards

Teachers guide for the Young Naturalists article "A Most Amazing River" by Mary Hoff. Published in the July–August 2008 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/mississippi

Cut along the horizontal lines, fold on the dashed vertical line and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

FOLD HERE

FOLD HERE

FOLD HERE