

Geographic Educators of Nebraska

Advocating geographic education for all Nebraskans

Water, Water Everywhere

Students will examine the sources and usage of water in Nebraska in the past and present.

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| Author | Karen Graff |
| Grade Level | 4th |
| Class Period(s) | 1-3 (40 – 50 minutes) |

Nebraska Social Studies Standards

SS 4.3.1

Students will explore where (spatial) and why people, places and environments are organized in the state.

SS 4.3.1.a. Read local and state maps and atlases to locate physical and human features in Nebraska.

SS 4.3.1.b Apply map skills to analyze physical/political maps of the state.

SS 4.3.1.c Analyze why things in Nebraska are located where they are in Nebraska.

SS 4.3.2 Students will compare the characteristics of places and regions and their impact on human decisions.

SS 4.3.2.a Identify criteria used to define regions within the state of Nebraska.

SS 4.3.2.b Classify regions and places within the state of Nebraska using physical and human features

SS 4.3.2.c Identify and classify regions.

SS 4.3.3 Students will identify natural processes in the

Nebraska Science Standards

4.2. Earth Structures and Processes

5.4.2 Students will observe and describe Earth's materials, structure, and processes.

Properties of Earth Materials

5.4.2.a Describe the characteristics of rocks, minerals, soil, water, and the atmosphere

Earth's Processes

5.4.2.b Identify weathering, erosion, and deposition as processes that build up or break down Earth's surface

Use of Earth Materials

5.4.2.c Identify how Earth materials are used (fuels, building materials, sustaining plant life)

Nebraska Language Arts Standards

LA 4.1.6

Comprehension: Students will construct meaning by using prior knowledge and text information while reading grade-level literary and informational text.

LA 4.1.6.f Use text features to locate information and explain how the information contributes to an understanding of print and digital text.

LA 4.1.6.i Construct and/or answer literal, inferential, and critical questions and support answers with explicit evidence from the text or additional source.

Nebraska Math Standards

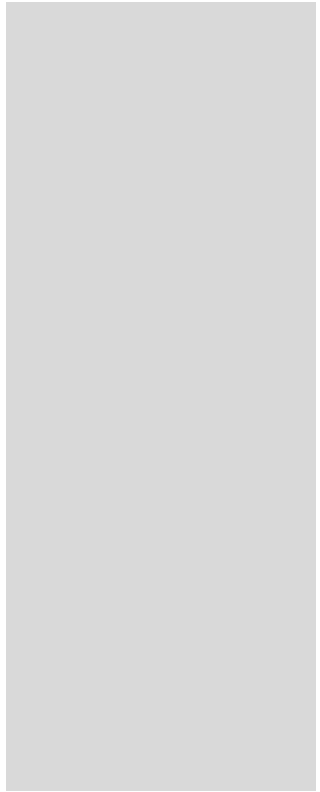
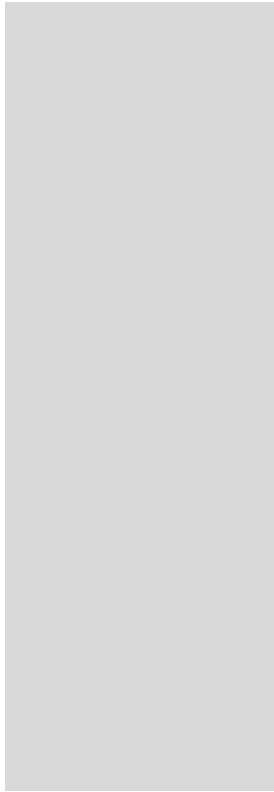
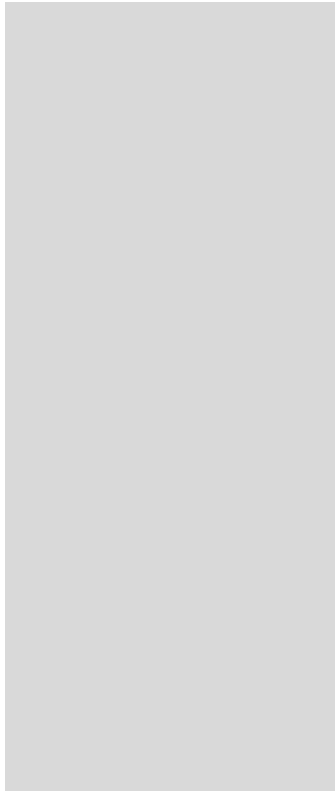
physical world.

SS 4.3.3.a Identify physical processes that shape Nebraska's features and patterns.

SS 4.3.3.b Identify examples of ecosystems located in Nebraska

SS 4.3.5 Students will identify how humans have adapted to and modified different environments in Nebraska.

SS 4.3.5.b Describe how humans have adapted to and modified Nebraska's physical environment.



Overview

Water is essential to the survival of all living things, but we often take it for granted. Students will study the sources and usage of water in Nebraska and make inferences about its impact.

Purpose

Students should understand the value of water as a resource and the impact it has had over time.

Key Vocabulary

Precipitation-Any type of water that forms in the Earth's atmosphere and then drops onto the surface of the Earth.

Reservoir-An artificial lake where water is stored. Most reservoirs are formed by constructing dams across rivers.

Aquifer-An underground layer of rock that holds groundwater. Groundwater is rain or melted snow that has seeped into the ground and is held there.

Braided River-A flowing body of water separated into channels by tiny islands.

Source: <http://nationalgeographic.org/glossary>

Materials

- Student Atlas of Nebraska (1 copy for each student)
- Water, Water Everywhere Notes

Objectives

The student will be able to:

- Identify sources of water in Nebraska.
- Explain how water is used to benefit Nebraskans.
- Compare maps to see how rivers have impacted life in Nebraska over time.

Procedures

(Where there are 2 page numbers, the second is for the 2nd edition of the *Atlas*.)

This lesson has three sections that can be taught as one lesson or divided into shorter lessons. The first part addresses the sources of water in Nebraska. The second addresses how the water sources were used historically, and the third considers present water usage and human adaptations.

1. Introduce or review the Key Vocabulary words. Ask students to refer to the Table of Contents and identify three maps they will use based on those words.

Page 9 "Average Annual Precipitation"

Page 11 "Rivers and Reservoirs"

Page 13 "Ogallala Aquifer"

2. Begin with the "Average Annual Precipitation" map on page 9. Guide class discussion through the questions focusing on the lesser amounts of precipitation in the western part of the state.

3. Proceed to the "Rivers and Reservoirs" map on page 11. Guide class discussion through the questions. Ask students to identify the Missouri River as the "natural" boundary of Nebraska and Iowa, and have them locate the river nearest their home. Note the number of large rivers in central and eastern Nebraska. Study the river photos on pages 12 (Niobrara), 20 (Platte), and 37/41 (Loup) and read the captions for information.

4. Move on to the "Ogallala Aquifer" map on page 13. Note the size of the Aquifer and the number of wells in the eastern region.

5. Students should make connections across the three maps to conclude that western Nebraska is generally drier with less surface water and fewer wells than eastern Nebraska.

Complete the *Sources of Water* portion of "Water, Water Everywhere Notes."

Next, students will look at the impact of water **historically**.

6. Begin with the "Natural Vegetation" map on page 14. Make it clear that "natural" means this map illustrates what existed before human intervention. Guide discussion of the questions. Students should infer a relationship between the tallgrass prairies and the amount of precipitation in the East, mixed-grass in central Nebraska as precipitation decreases, and shortgrass in the Panhandle, which is the driest area. They should also note the forested areas mainly near rivers. Move on to the "American Indian Tribes" map on page 17. Again, students should be able to connect water sources in the eastern part of the state with the farming cultures.

7. Continue with a historical view of the connection with water sources on page 19, "Expeditions." Note the Lewis and Clark expedition along the Missouri River (suitable for transportation) and the Long expedition near the Loup and Platte Rivers. Refer to the Teacher's Guide #19-20 for an explanation.

8. The “Historic Trails” map on page 21 shows a similar pattern of travel along the rivers.

Complete the *Water’s Historical Impact* portion of “Water, Water Everywhere Notes.”

Finally, students will consider **present water usage and human adaptations**.

9. Look at the “Corn” and “Soybeans” maps on pages 34/37 and 35/38. Note that these crops are grown primarily in the East. Students might refer back to the water maps on page 9, 11, and 13 to see a connection (more precipitation, wells, and surface water in the East). Additional information can be found at these sites. Students may find it interesting that corn is a member of the grass family.

<http://www.fs.fed.us/wildflowers/ethnobotany/food/grains.shtml>

<http://www.fs.fed.us/wildflowers/ethnobotany/food/legumes.shtml>

The “Wheat” map on page 36/39 shows that most of this crop is grown in western/southwestern Nebraska as it requires much less water than corn.

10. Dams and wells are two examples of human adaptations made to surface and ground water sources. Refer to the map of “Rivers and Reservoirs” on page 11 once again. This time, have students identify the symbol for dams and locate them on the map noting the reservoirs created by them. Locate Lake McConaughy, Nebraska’s largest reservoir. Refer to the Lake McConaughy Teacher Background Information for some details. Explain that dams are built for several reasons.

- flood control
- hydroelectric power generation
- reservoir for irrigation, water supply
- recreation is often a secondary benefit

End with the “Ogallala Aquifer” map on page 13. Lead a discussion of the question “What do we do with this water?” Share information for #13 from the Teacher’s Guide to the Maps.

Complete the *Human Adaptations* portion of “Water, Water Everywhere Notes.”

Assessment

Exit Slip—Ask students to identify one source of water in Nebraska, one historical impact of water, and one human adaptation of a water source and the purpose of that adaptation.

Extensions

1. Braided Journey –“Follow conservation photographer Michael Forsberg and field producer Pete Stegen as they begin a two-month, 1000 mile traverse of the Platte River Basin. Traveling by bike, foot and canoe through Wyoming, Colorado and Nebraska, they will explore this critical water source, and show you how it intersects with the lives of those that live in this 90,000 square mile watershed in the heart of North America.”

<http://plattebasintimelapse.com>

This site shows the Platte River Basin in time-lapse photography. There are many stories you can view, but “Braided Journey” is most recommended. Begin with the introduction to see the map of the journey. These captioned slides are especially relevant: Slide 30 - Reaching the land over the Ogallala Aquifer Slides 33-41, 44, 52, and 55 (reaching the mouth of the Platte at the Missouri)

2. Students might research one or more of the water compacts with bordering states such as:

- Republican River Compact with Kansas and Colorado
- South Platte River Compact with Colorado
- North Platte River Compact with Colorado and Wyoming
- Kansas-Nebraska Big Blue River Compact
- Wyoming-Nebraska Compact On Upper Niobrara River

3. The proposal for the Keystone XL Pipeline generated a great deal of controversy over potential risk to the Ogallala Aquifer, among other issues. Students can research the concerns of Nebraskans regarding the issue.

Sources

<http://nationalgeographic.org/glossary>

<http://plattebasintimelapse.com>

Support for these lessons was provided by: Geographic Educators of Nebraska (GEON) a member of the National Geographic Geography Alliances and Nebraska Department of Education (NDE) Social Studies Department

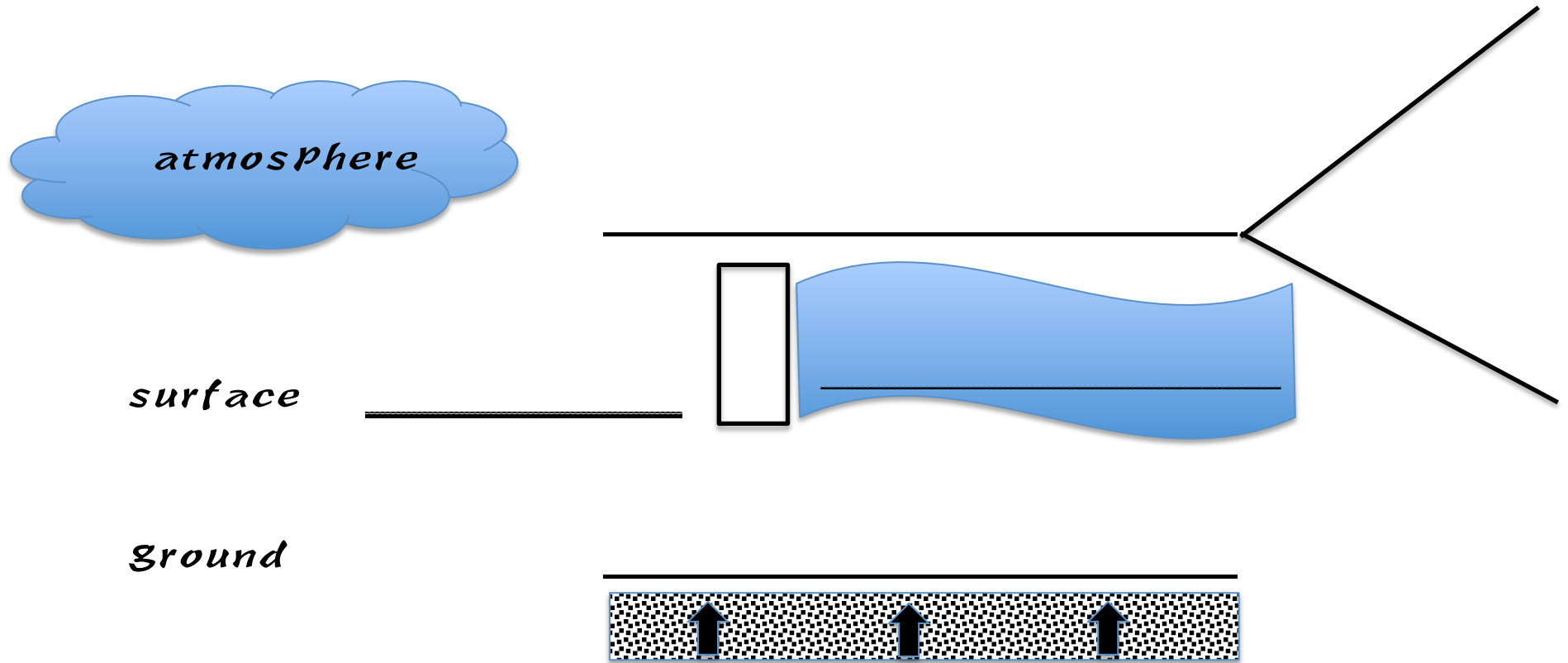
Lake McConaughy Teacher Background Information

- * Kingsley Dam was completed¹ in 1941 (75 years ago) on the North Platte River, but work began in 1936.
- * Lake McConaughy is the reservoir created by Kingsley Dam. It is the largest reservoir in Nebraska, has 76 miles of shoreline, and is 22-miles long.
- * Charles McConaughy and George P. Kingsley were two of the founders who worked to obtain legal rights and financing for the project.
- * Kingsley Dam was built mainly to store water for crop irrigation through canals and pipelines.
- * The project “required moving 39 miles of state and federal highways, 33 miles of Union Pacific Railroad track, 22 miles of county roads, 20 miles of oil pipelines and the entire town of Lemoyne.”¹
- * It has been used to generate electricity since 1984.
- * Lake McConaughy has about one million visitors each year.
- * Economic benefits from the dam and lake (irrigation, hydropower, and recreation) range from \$556 million to \$806 million each year.

¹ http://www.omaha.com/opinion/editorial-big-mac-gives-back-big-time/article_d20b193d-80b4-5798-9c16-08e4647eb249.html

Water, Water Everywhere Notes

Sources of Water



Water, Water Everywhere Notes

Water's Historical Impact

Explorers

Lewis and Clark _____ River

Stephen Long _____ and _____ Rivers

Native American

Farming Cultures

Type of Natural

Vegetation

_____ east
_____ central
_____ west
_____ near rivers

Migration

Routes

Water, Water Everywhere Notes

Human Adaptations

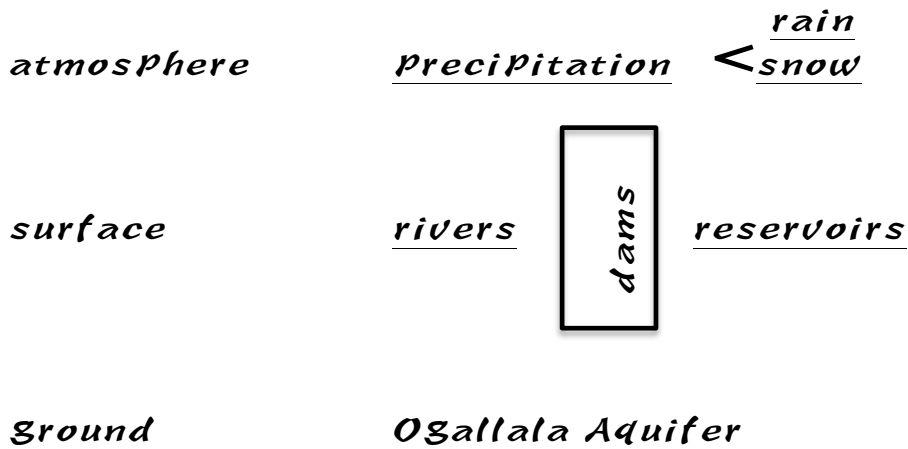
How many dams are on the "Rivers and Reservoirs" map on page 11?

What are some reasons for building dams?

- _____
- _____
- _____

Why is groundwater so important to us?

Sources of Water



Water's Historical Impact

| | | |
|-----------|-----------------|--------------------------------------|
| Explorers | Lewis and Clark | <u>Missouri</u> River |
| | Stephen Long | <u>Platte</u> and <u>Loup</u> Rivers |

| | |
|----------------------------------|-----------------------|
| Native American Farming Cultures | <u>Ponca</u> |
| | <u>Omaha</u> |
| | <u>Pawnee</u> |
| | <u>Otoe-Missouria</u> |

| | | |
|-----------------------------|--------------------|-------------|
| Types of Natural Vegetation | <u>tallgrass</u> | east |
| | <u>mixed-grass</u> | central |
| | <u>shortgrass</u> | west |
| | <u>forests</u> | near rivers |

| | |
|------------------|---------------------|
| Migration Routes | <u>Mormon Trail</u> |
| | <u>Oregon Trail</u> |

Human Adaptations

How many dams are on the "Rivers and Reservoirs" map on page 11?

7

What are some reasons for building dams?

- control flooding
- generate power
- irrigate crops

Why is groundwater so important to us?

We need a lot of groundwater to irrigate crops and water livestock. Most of our water for personal use is groundwater.