



Teacher Guide

Volume 19, Issue 3 2004/2005

About Your AgMag

Your AgMag is distributed primarily to teachers in grades studying Minnesota (usually fourth or sixth). If the magazine fits better into the curriculum program at another grade level, we encourage you to pass the material on to the appropriate teachers. Offered at no cost to you, the AgMag is a product of Minnesota Agriculture in the Classroom. Here is your third and final Minnesota Agriculture Magazine for the 2004-2005 school year. This issue of your AgMag is designed to help you:

- provide students with a base of information for identifying and understanding the connections between agriculture and natural resources
- foster a stewardship ethic toward land, water and air
- show some of the ways science and technology are combining with agriculture to meet the needs of a changing world
- develop awareness and make connections between Minnesota's biomes and crop production regions
- give students a glimpse of how the land was formed and the role glacial activity played in our state's agricultural productivity.

Academic Standards Connection

The Minnesota AgMag and other educational materials from Minnesota Agriculture in the Classroom can help you implement the new Minnesota academic standards. These materials can serve as wonderful "real life" connections and supporting pieces as you incorporate Reading and Literature, Social Studies, Science, Math and Environmental Education.

In This Guide: Don't Miss...

- **SHOW WHAT YOU KNOW** pretest and post-test on page 6. Check your students' knowledge of key agricultural concepts before and after reading the AgMag.
- Discussion prompts, background information, extended activities and answers.
- Reproducible maps or overhead transparency masters designed to be used to increase understanding of the interconnection of our natural resources with geography and agriculture.

Minnesota Grown: Major Crop Regions (p. 4)

Minnesota Biomes (p. 4)

Minnesota Drainage Basins (p. 5)

Hello out There (Resources)

Additional opportunities to enhance your AgMag use and to help you implement the academic standards.

MINNESOTA AGRICULTURE IN THE CLASSROOM

Attn: Al Withers, Program Director

90 West Plato Boulevard

St. Paul, Minnesota 55107

Telephone: 651-296-6688

E-mail: alan.withers@state.mn.us

www.mda.state.mn.us/maitc



Visit this web site to find great educational resources for classroom integration.

www.agclassroom.org

TWIN CITIES PUBLIC TELEVISION (TPT)

Minnesota: A History of the Land is the story of Minnesota people and landscapes from the retreat of the last ice sheets to today's growing suburbs. This stunning four-part documentary series helps Minnesotans understand our past, present and future. For April 2005 air times, or to order a DVD or Teacher Guide, visit: www.historyoftheland.org

Two new Ag in the Classroom products now available!

Food for Thought; A Geography of Minnesota Agriculture A Standards-Based K-12 Curriculum

NEW!
Order FREE today! Food for Thought mapping curriculum includes a full-color desk map for each of your students, plus a 72-page Teacher Guide with nine geography lessons and 36 black line master maps. All lessons are written to support the new social studies academic standards. Co-sponsored by the Minnesota Alliance for Geographic Education. Great for grades 4-8 geography. Order online at the Minnesota Ag in the Classroom website at www.mda.state.mn.us/maitc.

Agricultural Children's Literature "Book Bundle"

NEW!
M-AITC now offers a unique collection of children's books that focus on plants, animals, food, fiber and gardening. This 22-title book bundle has been assembled for your convenience. Great for classroom or library use. Most are factual, non-fiction titles. List price is \$370 but is now available to you at a special price of \$285 plus \$14.25 shipping and handling. Order online at the Minnesota Ag in the Classroom website at www.mda.state.mn.us/maitc.

MINNESOTA PROJECT FOOD, LAND AND PEOPLE

55-lesson "Resources for Learning" Second Edition Teacher Handbook

Modeled after the nationally acclaimed Projects Learning Tree, Wild and Wet, you'll love the diversity and scope of these lessons (950- page book). Available through a nominal cost six-hour workshop (preferred) or for direct purchase at \$50 postage-paid.

Interested in attending or helping to organize a workshop in your school district?

Contact: Susan Anderson at sandband@rconnect.com

Dr. Vern Cardwell at cardw001@umn.edu

Al Withers at alan.withers@state.mn.us

Glossary

Each AgMag contains several words that may be unfamiliar to your students. You may wish to preteach these words, or take time to define them as they appear throughout the magazine. In most cases, the words appear in bold type and/or are defined in the magazine. Highlighted words in this issue are: **aquatic, infectious, pollution, impaired, photosynthesis, strip-cropping, erosion, prevailing winds, perennial** (pages 2 and 3); **glacial till, moraines, biomes, Red River Valley, peatlands, peat** (pages 4 and 5); **renewable, diesel, biodiesel, biomass, by-products, ethanol** (page 6); **drainage, wetlands** (page 7).

Integration

Your AgMag materials are created by experienced classroom teachers. An Editorial Review Committee of teachers and subject matter experts provides content ideas and reviews each issue for accuracy and relevance.

Some teachers use the magazine as a separate lesson; others integrate magazine content into specific areas of the curriculum. The subject matter and skills listed will help you select appropriate agricultural activities to integrate into other curriculum areas.

Language Arts, Reading: Use the articles and activities to develop a variety of skills: outlining, reading for the main idea, vocabulary development and spelling words (bold words).

Social Studies: After reading pages 2 and 3, invite students to tell about things they are doing to help the environment. Encourage ideas about things they would like to study or projects they would like to take on to further help and understand the environment. Some of their ideas will bridge into science and other areas.

Geography: See maps on pages 4 and 5 and page 8 in AgMag and reproducible pages 4 and 5 in this Teacher Guide.

Science, Environmental Education: The entire AgMag is directed toward environmental education. See pages 4 and 5 for glacial effects, biomes and more.

History: See page 7 for “Changing Faces of the Land.”

Discussion Prompters

AgMag Cover (Social Studies, Science, Environmental Studies)

1. Discuss what students know about forces that created Minnesota’s terrain and soils. What land features do students see in the photos? How do they think they got there?

AgMag Pages 2 and 3 (Economics, Social Studies, Science)

1. Just what are “Minnesota’s natural resources”? (Brainstorm a list; think about all the wonderful things that occupy our air, land and water. Don’t forget people!) Why is it necessary to protect these treasures?
2. Why do we say farmers are some of our most important environmentalists? (They manage such a large amount of land—over 46% nationally—so the ways they care for and protect resources are very important.)
3. How many ways do you use water each day? How much water do you use? (Showering, 5 gal/min; toilet flushing, 6 gal.; brushing teeth, 2 gal.; hand washing, 2 gal.; automatic dishwasher, 15 gal./load; washing machine, 20-30 gal./load.) **NOTE:** *The 200 gallons of water needed to produce each person’s food for a day includes all the water used to grow, clean, process, preserve and get the food to the table.*

AgMag Pages 4 and 5 (Science, Social Studies)

1. Minnesota is the meeting place of a powerful “big three” that play a role in our leading place in agriculture. Use the reproducibles in this Teacher Guide together with the information on AgMag pages 4 and 5 to explore “the big three”— water, weather and good soils/terrain.
 - a. Water: Major watersheds meet here, sending water flowing in three directions. What are they? See *Minnesota Drainage Basins* in this Teacher Guide on page 5.
 - b. Weather: Dry weather from the west; warm, moist weather from the Gulf of Mexico; and frigid, cold weather from Canada all collide in Minnesota. What does that mean for our weather patterns? (They produce the right amount of rainfall in the right places at the right times. We get a great variety in our weather.)
 - c. Soils/Terrain: Using the maps and overlays in this Teacher Guide, compare location of Lake Agassiz and its rich lake bottom soils with Minnesota’s three biomes and growing regions. Then identify your biome, your watershed and your growing region. Ask students to describe water, weather and biomes in your area. How does this influence agriculture in your area?

Biomes: Pinelands in the east and north; Prairies in the south and west; and Hardwoods in the east and central sections of the state. How do the natural biomes correspond with growing regions? Use overhead transparencies as overlays to illustrate. (See Teacher Guide pages 3 and 4.)
4. Choose another state where you’d like to visit or live. How are the water, weather and biomes different from your Minnesota home? What causes the differences?

AgMag Page 7 (Social Studies, Science, Environmental Studies, Geography, Math)

1. Why were changes to the land minimal in the years before settlers flooded in from Europe? (Early people lived in close connection with nature and seasons as they occurred naturally. Less people meant less demand on the land.)
2. Why was drainage of wetlands important to agriculture? (It converted marginal land to land productive for food crops or for building upon.)
3. Why are wetlands important to an ecosystem? (They are nature’s “sponges.” They store water and slowly release it, helping to control flooding. They are habitats, water purification systems and scenic attractions.)
4. What made people realize that prairies, forests and wetlands need to be preserved in their natural state? (Accept reasonable answers.)
5. How do you think it’s possible for the U.S. to now be adding 250,000 acres of wetlands yearly? (Accept reasonable answers. The majority of reclaimed wetlands are coming through conservation programs where farmers take certain fields out of production and allow natural vegetation to grow back. Removing paving, pipes and other means of redirecting water allows some wetlands to develop. Minnesota and some other states now have regulations about wetland “exchanges.” If a wetland is drained, another must be developed in the area. The goal is “no net loss.”)
6. Why do you think people are willing to take the money, time and effort to try to reclaim wetlands? (They recognize significance of wetlands more today.)
7. For interested students, you may wish to suggest further research of wetland reclaiming in your area, or of a larger, well-known wetland system like the Florida Everglades.
8. In what ways are people changing the terrain and soils and air of your own community? What are the pros and cons of such changes?

Using your Map Overlays

The Minnesota Biomes and Minnesota Major Crops maps on page 4 of this Teacher Guide are designed so you can make overhead transparencies. You may wish to discuss each topic separately, then overlay the maps so students can see how Minnesota's agricultural crops and activities are influenced by the natural biomes.

The crop regions are:

Northwest - Flat land with fertile prairie soils. Enough moisture to be a big producer of cash grains: wheat, oats, soybeans, barley, sunflowers, sugarbeets, dry beans and potatoes.

Northeast - Rough, rocky areas and less fertile forest soils. Few field crops, but many pine and hardwood forests.

Southwest - Fertile soils, more moisture. Location farther south gives longer growing season. Big producer of crops and livestock. Corn, soybeans, cattle and hogs are examples.

Central/Southeast - Hilly region dotted with hay and pasture lands. Leading area for dairy cattle, with other livestock and crops, too.

ANSWERS: AgMag

Please Note: If answers are supplied in the AgMag itself, they are not repeated here.

CARE FOR THE WATER, p. 2

250 gallons of water equals one ton.

CARE FOR THE SOIL, p. 2

soil

NATURAL RESOURCES, p. 2

water; soil; air

HOLDING ONTO SOIL, p. 3

1. strip-cropping - D
2. windbreak - C
3. no tillage - A
4. grassed waterways - B

BOUNTIFUL BIOMES, pgs. 4 and 5

Name the biome - top to bottom.

Prairies - photo B

Pinelands - photo C

Hardwoods - photo A

SHOW WHAT YOU LEARNED, pgs. 4 and 5

What makes Minnesota a great agricultural state? Answers will vary. Accept any reasonable responses which may include good soils, moisture, growing season, terrain for farm machinery, etc.

FUN TO KNOW, pgs. 4 and 5

What is peat? Peat is plant life and mosses that have been partially decomposed in water. When dried out, peat makes good fuel, fertilizer, animal bedding, packing material, and even has medical uses. Highly compressed over long periods of time, peat can become coal.

TRY THIS, p. 6

Ethanol is a fuel made from corn and other agricultural crops. It's renewable, burns cleaner than petroleum products and is a market for Minnesota farmers.

WATER WATCH, p. 8

1. Red
2. Rainy
3. Mississippi
4. St. Louis
5. St. Croix
6. Rum
7. Minnesota
8. Root

NAME THE DAY, p. 8

Arbor Day, on Friday, April 29, 2005.

A CAPITOL QUESTION, p. 8

The four Quadriga horses represent the powers of nature: earth, wind, fire and water. The women symbolize civilization and the man represents prosperity.

HOW MANY MINNESOTANS, p. 8

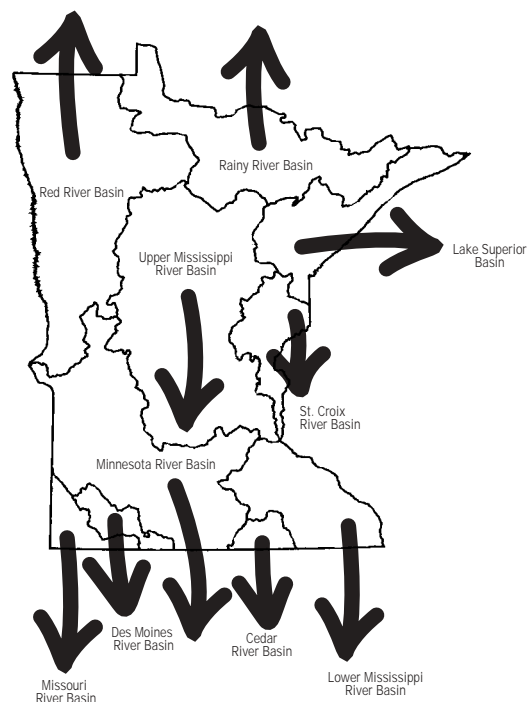
It will take about 10 years to reach six million people in Minnesota.

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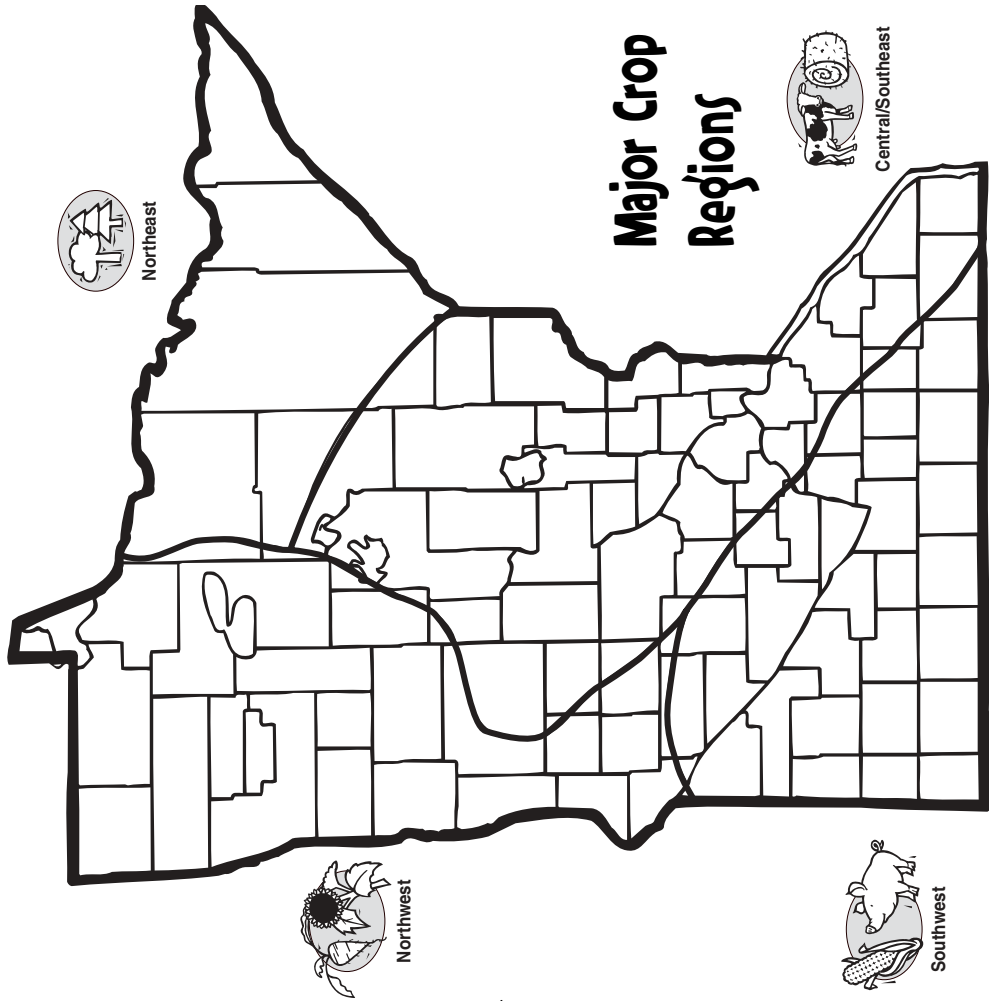
SHOW WHAT YOU KNOW!

1. b; 2. c; 3. b; 4. a; 5. b;
6. d; 7. a; 8. a; 9. d; 10. a.

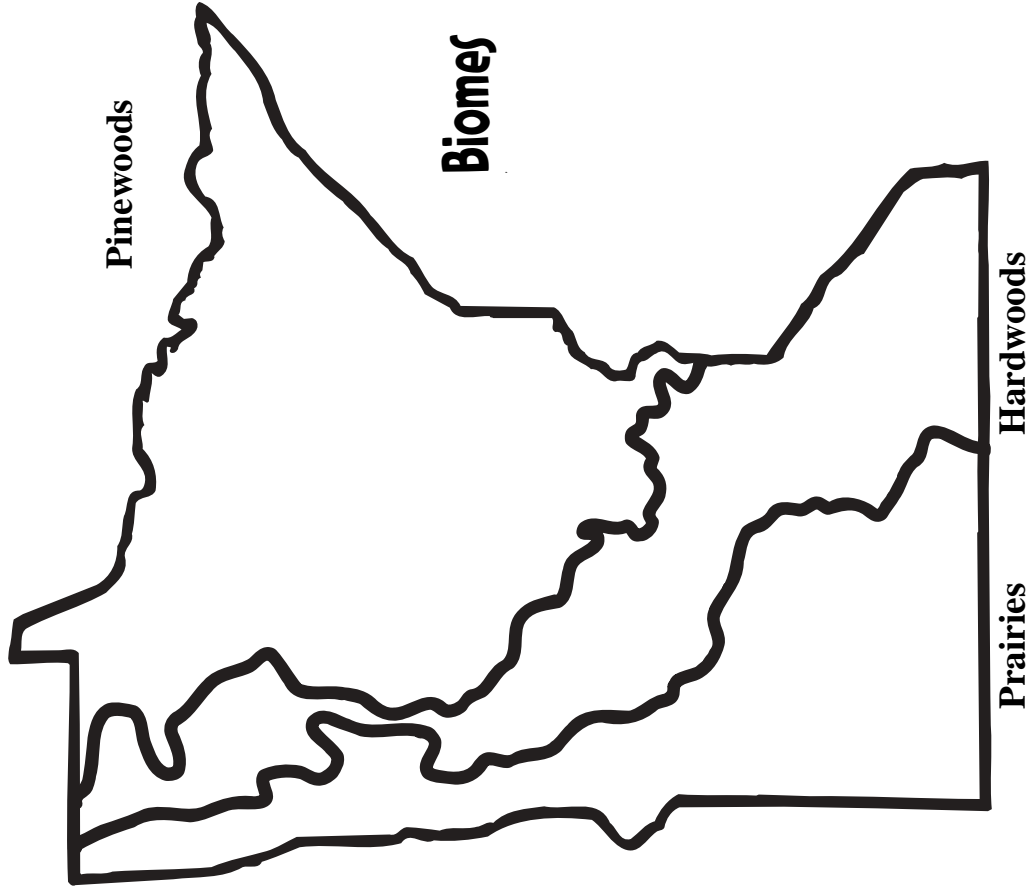
MINNESOTA DRAINAGE BASINS!



Minnesota



Major Crop Regions



Biomes

Pinewoods

Prairies

Hardwoods



Minnesota Drainage Basins

A **basin** (or drainage basin) is the area of land that drains to a particular river or lake. Minnesota has 10 major drainage basins. Each drainage basin is made up of smaller units called **watersheds**. A watershed is an area of land from which rain and melted snow trickle down to the lowest point ... a stream, river, lake or ocean. On its way, the water travels across and under farm fields, forestlands, lawns, city streets and gardens.

The squiggly lines on the map show watersheds.

Show the Flow!

The water in Minnesota's drainage basins flows in three directions. Mark arrows on the map to show the direction each basin flows:

1. The Red River of the North Basin and the Rainy River Basin flow *north* to Hudson Bay.
2. The Lake Superior Basin drains *east* to the Atlantic Ocean.
3. The remaining seven basins drain *south* to the Gulf of Mexico. This includes the Minnesota, Missouri, Des Moines, Root and St. Croix Rivers. All are part of the greater Mississippi River Basin.

Think & DISCUSS

- In which drainage basin do you live?
- In which rivers, lakes and ocean does the water from your drainage basin end up? For example, the major watersheds of the Lake Superior Basin are the St. Louis River, the Cloquet River, Lake Superior (North) and Lake Superior (South).
- If you pollute water in your community, who is affected? (**HINT:** Remember your answer to the question above.)
- How would you explain: "We borrow water! We get it from someplace, we use it, then send it somewhere else?"

Note to Teachers:

You are encouraged to send the Pre and Post-Test results to Ag in the Classroom to help document student learning. Use the attached post-paid evaluation card.

Name _____

Check one Pretest Post-Test

SHOW WHAT YOU KNOW!

Take this short quiz before you read your AgMag, then again after reading the magazine. See the improvement!

1.

Glaciers moved across Minnesota

- a. in 1900.
- b. several times.
- c. once a thousand years ago.

6.

Trees and plants help the environment by

- a. releasing oxygen.
- b. holding soil.
- c. providing habitat for animals.
- d. a, b, and c.

2.

The two main natural resources affected by agriculture are

- a. iron ore and minerals.
- b. air and natural gas.
- c. soil and water.

7.

Forests, prairies and wetlands

- a. are important as they naturally occur.
- b. are useless unless we change them.
- c. should be turned into farms to produce more food whenever possible.

3.

Fuel refined from materials such as soybeans or animal fat is called

- a. diesel.
- b. biodiesel.
- c. gasoline.

8.

Minnesota's population is

- a. 5 million.
- b. 20 million.
- c. 2 million.

4.

The water we use today is the same water that was here when dinosaurs roamed the earth.

- a. True
- b. False

9.

By protecting soil and water, we protect

- a. wildlife.
- b. the human food supply.
- c. trees and plants.
- d. a, b, and c.

5.

This immense lake was bigger than all the Great Lakes combined. It once covered the center of North America, including parts of Minnesota.

- a. Lake of the Woods
- b. Lake Agassiz
- c. Long Lake

10.

Minnesota's Arbor Day is always the last Friday in April.

- a. True
- b. False