

30 Years
of Exploring
Agriculture

AgMAG

Agriculture: Helping you every day!



Caring for Our Natural Resources

Minnesota, the "Land of 10,000 Lakes,"

is really the land of nearly 20,000 lakes, ponds, and marshes of five acres or more. Forests cover one-third of our state. End to end, our rivers could reach around the world. Our cropland would cover all of Rhode Island, Massachusetts, Connecticut, and Vermont. Fresh air, rich soil, lots of rain most years, good climate, crops, livestock—our state has them all.

Minnesota's agricultural industries depend on these natural resources. We depend on agriculture. That's why our farmers and others must act as **stewards** of the land, protecting these important resources.

- When we prevent water pollution, we help keep water safe for cooking, swimming, drinking, and aquatic life.
- When we protect our soil, it can grow good food, fiber, and fuel (energy) for the future.
- When we clean up our air, we make life healthier for people, plants, and animals.

Nearly three-fourths of the land in Minnesota is owned by farmers and other private landowners. Why is it important that all landowners and users be good stewards of the land?

Find teacher guide and student resources at www.mnagmag.org



Celebrating Our Natural Resources



Water

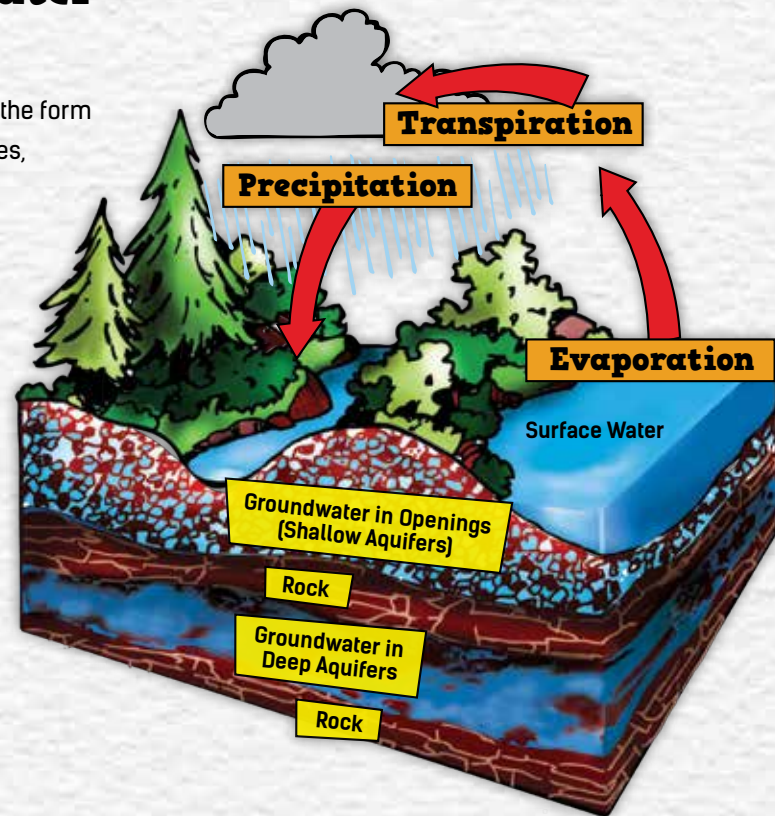
Where Does Our Water Come From?

Water comes to us through precipitation in the form of rain or snow. The water moves through our landscape in rivers, lakes, wetlands, and **groundwater**.

Aquifers can be small or large. Sometimes we find water just a few feet below the ground. Other times the water may be hundreds of feet deep. No one knows for sure how much water is in our aquifers. It's affected by how much rain we get and how much water we pump from wells. Today 75% of Minnesota's drinking water and nearly 90% of the water used in crop irrigation is pumped from groundwater aquifers.

How do you like taking a shower in the same water molecules the dinosaurs waded in?

It's true! The water we use today is the same water that has been recycled for millions of years since the earth was formed. We will never have any MORE water. That's why we need to keep our water clean. We want the water we drink and use to taste good, smell good, and look good. We want it to be safe for all human uses and for aquatic creatures, too.



Cool Water Facts

- **97.2%** of Earth's water is salt water. Just **2.8%** is fresh water and available for human and animal needs.
- The longest river in the U.S. is the Missouri River. At about **2,340 miles** in length, it is slightly longer than the Mississippi River (2,320 miles). The two combine to form the longest river system in North America. There are hundreds of farmers and agricultural activities along these rivers.
- Water from **31 states** drains into the Mississippi River.
- The federal Clean Water Act requires states to set **water quality** standards. These rules limit how much pollution can be in lakes, rivers, streams, or groundwater before the water becomes unsafe for drinking, fishing, swimming, and more.
- Water covers about **70%** of the earth's surface.
- The earth recycles the same water over and over. This process is the water cycle, or **hydrologic cycle**. Water changes forms—from solid to liquid to gas—over and over again.
- The earth recycles **one trillion tons** of water every day. A gallon of water weighs 8 pounds. How many gallons are in just one ton (2,000 lbs)?



Soil

Why is Soil Important?

Soil holds roots in the ground so plants don't fall over. It also holds water so roots can absorb moisture, and it holds minerals and nutrients that plants use for food. Soil is also home to other living things helpful to plants.

The soil beneath our feet is as important as the air we breathe and the water we drink. Farms and forests make up two-thirds of our state's landscape. Who should care for the soil? Farmers and foresters have a big role to play. But we must also help. Here are things we all can do:

- Cover bare soil with new plants or mulch so soil won't wash or blow away.
- Stay on sidewalks and trails.

Air

Take a deep breath. Can you tell the difference between fresh air and polluted air?

Air moves, so polluted air can blow in from near and far. There are many people who work hard to clean up the air. Car makers build engines that pollute less. Laws set rules for companies to dispose of waste. Many people—including farmers—are making electricity from cleaner, renewable energy sources instead of coal or petroleum. They are using solar power, wind, and field crops as energy sources for our cars, homes, and factories. It all adds up to cleaner air!

Thanks, plants!

Did you know that green plants help to clean air? They take in carbon dioxide, trap fine dust, and release oxygen during **photosynthesis**. Those green plants include grasses on prairies, algae in oceans, crops in fields, and trees in forests. About one-third of the oxygen released comes from grasses and other non-woody plants. One-third comes from ocean plants. Another third comes from forests. Take a breath—and thank the plants!



Agriculture and Water

You already know that agriculture provides our food, fiber, and so much more. All plant and animal agriculture depends on water. How do today's farmers protect our water? They:

- Learn safest ways to use and handle crop-protection chemicals.
- Plant crops in strips, alternating row crops (such as corn) with hay or pasture crops.
- Plan and time crop irrigation.
- Keep livestock away from rivers, wetlands, and lakes.
- Keep manure and animal wastes contained.
- Leave plant remnants (stalks, leaves) on fields after harvesting instead of plowing them under.
- Keep grass or natural vegetation strips (buffer strips) along waterways, lakes, and rivers.

Why do farmers do these things?

Some good reasons are listed below. Write the letter from the list above next to one or more reasons that match it.

- Help keep toxic materials and pollution out of water supplies.
- Help reduce loss of soil to wind or water erosion.
- Conserve water.
- Help keep animal waste out of rivers, wetlands, and lakes.

What is Pollination?



The goal of every living organism, including plants, is to create offspring for the next generation. One of the ways that plants can produce offspring is by making seeds. This is done by **pollination**—when bees and other pollinators transfer pollen grains from the male **anther** of a flower to the female **stigma**.

Some food plants that need pollination include: alfalfa (feeds dairy cows, which provide us with milk and cheese), apples, blueberries, cucumbers, pumpkins, tomatoes, and watermelon.

Pollinators Need Our Help

Pollinators are so important to many of the foods we eat. Honeybees and other insects (wild bees, flies, wasps, moths, butterflies, and beetles) pollinate a wide variety of fruits, nuts, and vegetables. Without these pollinators, over 80% of the world's flowering plants would not be able to grow. That includes many foods that we rely on to survive.

There's increasing evidence that pollinators are in trouble and that their numbers are declining. Scientists believe this is due to several factors including loss of habitat, use of pesticides, and disease.

So what can we do?

Each of us can take one small step to help pollinators. Simple tasks like planting more pollinator-friendly flowers in your yard or in pots on your balcony can make a big impact.

Here are some other promises you can make to help pollinators:

- Spread the word about pollinators.
- Have water (bowls, birdbaths) for pollinators to drink.
- Grow milkweed for Monarch butterflies.
- Don't kill the dandelions in your lawn—they have nectar!
- Reduce the use of pesticides.
- If bees are being a nuisance, leave them alone.
- Plant flowering shrubs and trees.
- Start a beehive.



Pollinator Fun Facts

- Bees, bats, wasps, hummingbirds, humans, wind, and water all help to move pollen and pollinate plants.
- Together, Minnesota, Wisconsin, and Michigan have more than 500 species of native bees.
- A honey's color and flavor depends on the plants visited by the bees. Clover, buckwheat, orange blossom, alfalfa, and basswood are a few honey varieties. Try some different honeys and see if you can taste the differences.



Pollinator-Friendly Choices

Farmers are very aware of how important pollinators are. Here are some of the ways they are working to keep pollinators thriving. You can do some of these things in your own yard!

- Know your local pollinators and provide what they need to survive.
- Use crop-protection chemicals only when needed. Apply them during times when bees are less active, such as after sunset.
- Create pesticide-free landscapes and habitat areas.
- Grow a variety of plants that blossom at different times though the seasons.
- Help build bee populations by starting hives.



Bees in Surprising Places

Beekeeping is a hobby that's growing in surprising places! People want to do their part to help bees, and they want to grow more food locally.

Rooftops from the Minneapolis Institute of the Arts to downtown hotels and restaurants now host beehives! Minneapolis and St. Paul were among the first cities to allow beekeeping in urban areas. Are any beekeepers or **apiaries** in your community?

Trivia

How far does a hive of bees fly in order to produce one pound of honey?

- a. 10 miles
- b. 6,500 miles
- c. 55,000 miles

Hives On the Move

U.S. bee pollination needs are heaviest in our southern and western states. Many beekeepers move their bees from state to state to pollinate flowering crops. The hives travel the highways on trucks that are parked near the fields when the bees go to work.



CROSSWORD: Pollination

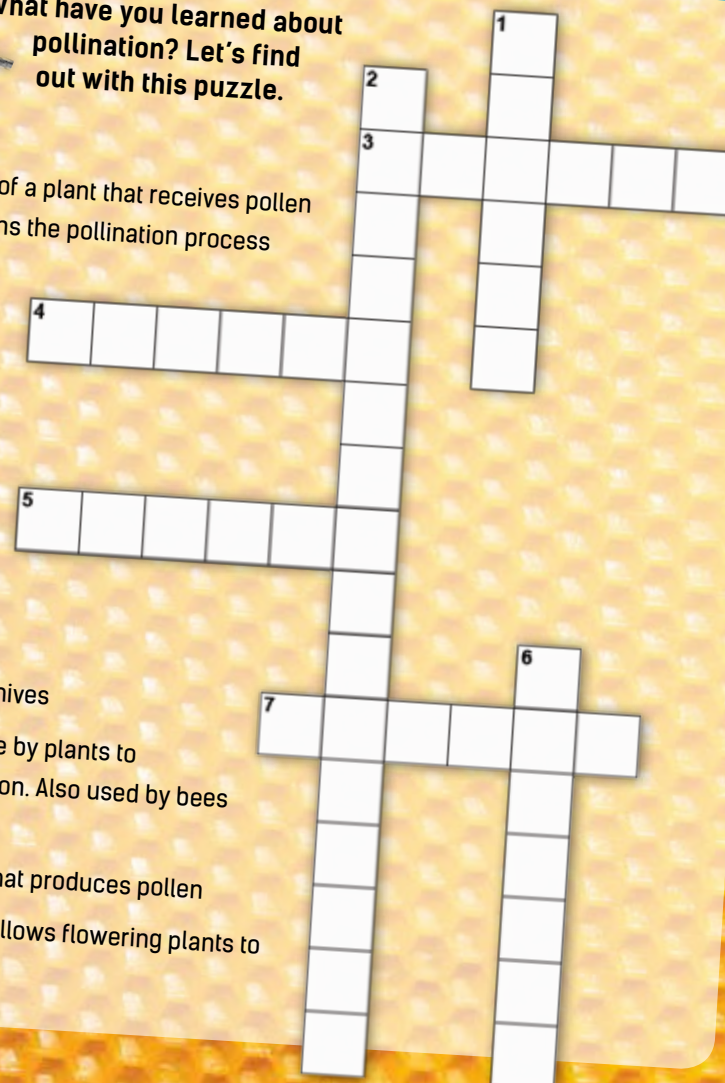
What have you learned about pollination? Let's find out with this puzzle.

Down

- The part of a plant that receives pollen and begins the pollination process
- Materials found in nature that can be used to make other products
- Something bees are kept in, usually a box

Across

- A collection of beehives
- A sugary fluid made by plants to encourage pollination. Also used by bees to make honey
- The part of a plant that produces pollen
- The substance that allows flowering plants to reproduce



Farms and Schools: Healthy Partnerships

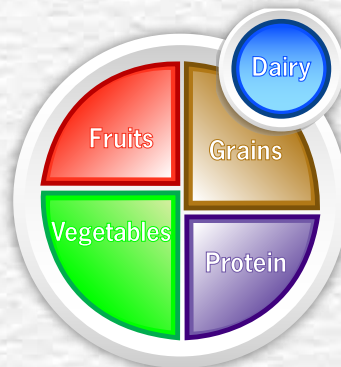


Did you know that many schools and farms are teaming up to improve the food at schools? They are getting food grown by local farmers onto school lunch trays. Kids in many schools see winter squash, sweet corn, melons, potatoes, and apples from local farmers. Locally grown food tastes great and is fresher because it's closer.

Over 1,350 Minnesota schools, representing more than 600,000 students, participate in farm to school programs. Linking schools with local farms means healthy meals in school cafeterias. It means learning lifelong healthy habits while supporting local farmers. Do you know where YOUR school lunch comes from?

Eat Well, Be Well!

What do you know about better food choices? What does it mean to eat healthier? MyPlate is a great reminder. It's a healthy eating guide from the U.S. Department of Agriculture (USDA). MyPlate shows how to divide your plate for a healthy meal. It shows the proportions and also details the food groups of vegetables, fruits, grains, proteins, and dairy. A look at MyPlate reminds us to:



- Eat smaller portions.
- Eat mostly vegetables, fruits, and whole grains.
- Choose from a big variety of proteins.
- Include calcium-rich foods.

Wiser Choices

MyPlate reminds us to avoid foods that are high in sodium or empty calories. Empty calories have the same energy as other calories but none of the vitamins, minerals, or other nutrients you need. Without those nutrients, you will not grow up as healthily or have as much energy as if you get plenty of nutrients. Examples of foods with empty calories are sugary drinks; sweets like cookies, ice cream, and candy; white bread and white rice.

Farm to School Fun!

Food served in schools—urban, suburban, and rural—is constantly changing due to farm to school programs.

- Students on the White Earth Indian Reservation enjoy locally grown, traditional foods such as wild rice, hominy, and squash.
- Students at Lewiston-Altura Elementary School try new locally grown foods each week during Taste-Test Tuesdays. High school students in this district can enjoy burgers made from bison raised near Winona.
- All students in the Hopkins School District are enjoying pasta sauce made from local tomatoes throughout the entire school year.

Menu Choices

Circle the better choice for each category, and discuss why.

Beverage:

Soda pop Water Milk

Main Dish:

Bacon cheeseburger with fries
Turkey wrap with raw veggies

Dessert:

Cookie Apple Hot fudge sundae

Minnesota Agriculture: 1970 - Today

Imagine a farm family from the 1800s stepping onto a modern farm today. How would they respond to all the changes?

Science and Technology Take the Lead

Computers manage farm businesses, keep crop and animal records, and so much more. Computers are built into many farm machines. A robot may milk a cow. A drone may fly over fields surveying land or finding insects. Barns are temperature-controlled to keep animals comfortable.

Plant and Animal Breeding

Scientists have improved plants and animals through careful breeding for many years. Today's farmer produces a leaner meat animal, dairy cows that give more milk, and grows crops like wheat and corn that are more insect-, drought-, and disease-resistant. For example, corn that used to be knee-high by the fourth of July in 1900 is often shoulder-high by that date today. Consumers get higher quality and more abundant plant or animal food products.

Precision Farming

Farming today is done in inches, not just acres. Digital software, drones, and GPS systems linked to satellites help farmers. Electronic devices can map every inch of a field and show just how to manage it for best production. They can control the number of seeds planted, provide the exact amount of fertilizer needed in each area, tell exactly where to kill weeds, and more. It's all done from laptop computers, cell phones, tablets, and tractor cabs.

New Flavors in Minnesota Agriculture

Over 7% of Minnesota's population was born in another country. Some immigrants moved to small towns and rural areas to work in agriculture. For example, jobs at farms, processing, and meatpacking businesses attracted seasonal workers and new immigrants to Worthington, Willmar, and other southern and western Minnesota cities. Immigrants make huge contributions to Minnesota agriculture every day.

Today's supermarkets are packed with hundreds of foods for us to choose from, including locally grown. Some stores have whole sections of food from countries around the world. Farmers markets, food cooperatives, and restaurants also offer a great variety of foods. What do you enjoy most about the diversity of Minnesota's foods?



A robot pushes feed so cows can reach it.



A drone surveys fields



Plant researchers studying pollination.











A tractor cab is the control center for field work.



Celebrate Minnesota Water

Minnesota's waters flow outward in three directions: North to Hudson Bay in Canada, east to the Atlantic Ocean, and south to the Gulf of Mexico.

Match each number from the map to the river it names.

	Minnesota		Mississippi		Rainy
	Red		Root		Rum
	St. Croix		St. Louis		



List 4 ways that YOU can help protect our rivers:

1. _____
2. _____
3. _____
4. _____

For 7 Generations

When making an important decision, an ages-old Native American question was, "How will this affect the people seven generations from now?"

What do you think this meant?

How would thinking like this make a difference in what we do to the environment today?

Learn about and order our **FREE** educational materials at www.mda.state.mn.us/maic.

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Bug Munching?

Do you think that you will eat insects in your lifetime? Check out some bug recipes and discover more about insects, plants, soil, fungi, and more.

Visit Just For Kids! at www.ars.usda.gov/Main/docs.htm?docid=13913

