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AgMag

The Magazine of Minnesota Agriculture in the Classroom

Caring for our Natural Resources

Minnesota, "The Land of 10,000 Lakes," is really the land of 20,000 lakes, ponds and marshes of five acres or more. Forests cover one-third of our state. Our rivers end-to-end could reach around the world. Our cropland would cover all of Rhode Island, Massachusetts, Connecticut and Vermont. Fresh air, rich soil, lots of water, good climate, crops, livestock—our state has them all.

Minnesota's **natural resources** are our treasures to protect. Our agricultural industries depend on these natural resources. We, the people, depend on agriculture. That's why our farmers and others must act as stewards of the land, or Earth Keepers, protecting these important resources.

When we protect our soil now, 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. When we prevent water pollution, we help keep water safe for cooking, swimming, drinking and **aquatic** life. 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 Earth Keepers?

Photo Courtesy Kevin C., Maplewood, MN

What natural resources can you find on this page?

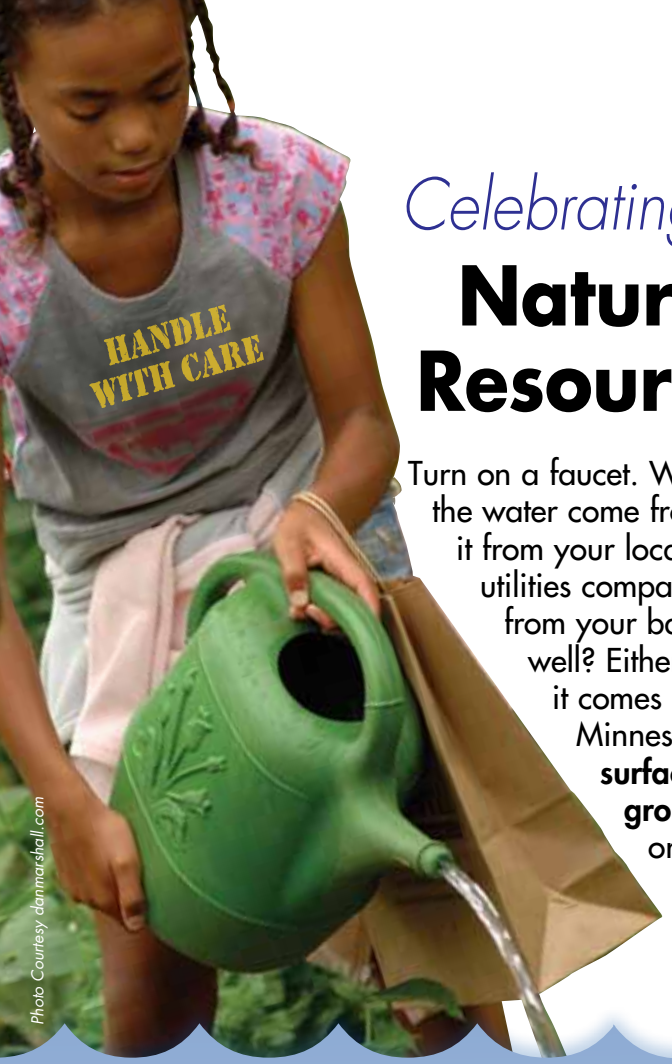


Photo Courtesy dannmarshall.com

Celebrating our

Natural Resources

Turn on a faucet. Where does the water come from? Is it from your local public utilities company? Is it from your backyard well? Either way, it comes from Minnesota's **surface water**, **ground water**, or both.

CARE FOR THE WATER

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.

If all the world's water could fit into a gallon jug, including salty oceans and frozen glaciers, only a single drop would be fresh and usable for human needs. The amount of fresh water isn't all we care about. 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.

Did you know?

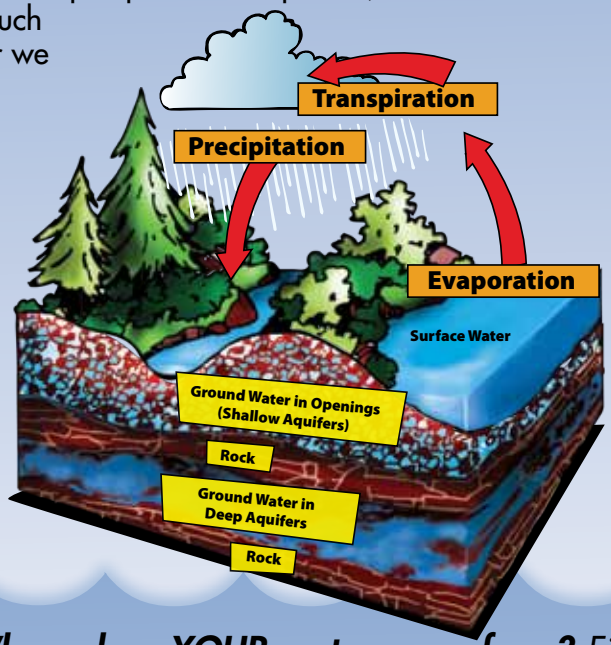
- The Earth recycles the same water over and over. This process is the water cycle, or **hydrologic cycle**. Water changes forms—from solid to liquid to gas—over and over again.
- The Earth recycles one trillion tons of water every day. A gallon of water weighs 8 pounds. How many gallons are in just one ton (2,000 lbs)?
- The federal Clean Water Act requires states to set water quality standards. These rules protect the nation's waters. How much pollution can be in lakes, rivers, streams or ground water before the water becomes unsafe for drinking, fishing, swimming and more?

Where Does Our Water Come From?

Guess what? Rain, snow, sleet, hail: All of the water we drink or use falls on the ground first. Some ends up in lakes, wetlands, rivers and streams as surface water. Some seeps, creeps, **percolates** and trickles down into the ground, becoming ground water. It finds its way into openings in rock, sand and gravel that catch and hold it. These underground water storage spaces are called **aquifers**. (Water in wells is pumped from aquifers.) Water levels in aquifers are connected to how much rain we get and how much water we draw from the aquifers.

Aquifers can be small in size or stretch more than ten thousand square miles. Sometimes we find water only a few feet below the ground. Other times it may be hundreds of feet deep.

Imagine how hard it is to find and map aquifers when we can't see them. Drilling wells gives us some information. But aquifer experts are still learning!



Minnesota's Water Wealth

Precipitation and Aquifers

Although we have some dry years, Minnesota is blessed with good **precipitation** most years. As our snow melts, soils soak up the moisture each spring. During the growing season, we usually get a good amount of rain at the right time for plants to thrive. The water in rivers, lakes and streams may change levels, but over time we have enough surface water.

We also have natural underground storage to hold our ground water in aquifers. The glaciers that covered much of our state many thousands of years ago left behind different kinds of rock and soil. Some parts of our state have a lot of hard rocks and clay. Rainwater and snowmelt collect in cracks, crevices and shallow aquifers there. Southeastern Minnesota, not covered by recent glaciers, has lots of sand, gravel and softer **sedimentary** rocks. Precipitation trickles easily into the ground and collects in large, deep aquifers. Minnesota's precipitation, surface water and ground water all make us a water-rich state!

ON THE WEB

Where does YOUR water come from? *Find out!*
The Groundwater Foundation Kids Corner www.groundwater.org/kc/kc.html

CARE FOR THE SOIL

What four-letter word does all these things?

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

Without it, life on land would come to a dead stop!

What is it? _____ _____ _____ _____

The soil beneath our feet is as important as the air we breathe and the water we drink. Farmland and forested land represent two-thirds of our state's landscape. Whose responsibility is it to care for the soil? Farmers and foresters have a big role to play. But each of us must also help. These soil care tips are things we all can do:

1. Grow plants on bare soil or cover it with mulch so it won't wash or blow away.
2. Stay on sidewalks and trails. What happens when people don't? Do you see any places where sidewalks should be built to protect the soil?
3. How can you help protect the soil of football and soccer fields, parks and other public places?

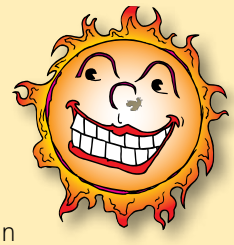
ON THE WEB For more on soils see: www.nrcs.usda.gov/feature/education

CARE FOR THE AIR

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

Air travels. That means polluted air can blow in from near and far. Lucky for us, many people work hard to clean up the air. Car makers build engines that pollute less. Laws regulate industrial waste disposal. 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.

Thanks to Minnesota's good rainfall and soil, only a half million of our 22 million acres of cropland (1 %) need irrigation. Compare that to rainfall-poor California, where 90% of cropland must be irrigated.

The agriculture industry knows it must take good care of water. Farmers are learning safer ways to use crop protection chemicals to keep them out of water supplies. They plant crops in ways that help prevent water from washing soil into streams, lakes and rivers. They plan and time irrigation to save water. They keep livestock away from riverbanks to prevent trampled soil and animal waste from ending up in the water. They manage animal wastes from feedlots. Some ag industries, such as ethanol plants, are exploring ways to use "reclaimed water." Reclaimed water (treated municipal wastewater) may be able to replace high quality (fresh) water and still meet the needs of some industries.

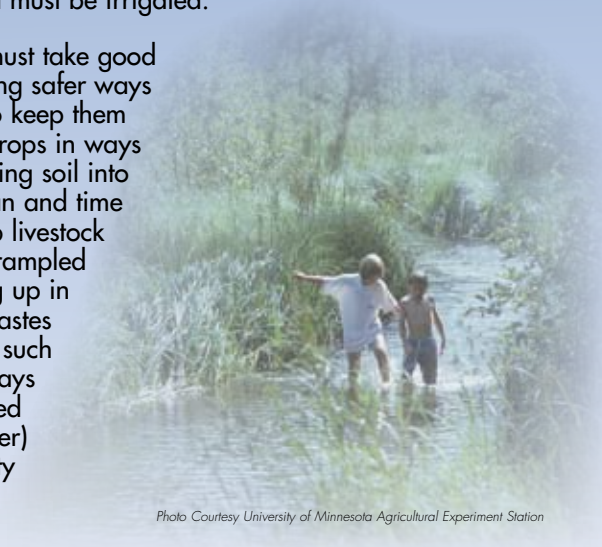


Photo Courtesy University of Minnesota Agricultural Experiment Station

Think and Discuss:

Many southern and western states have limited water and exploding populations. Finding enough water to meet their growing demands for agriculture is a challenge.

1. What needs must be met first if there is not enough water for everything?
2. Should Minnesota share our water wealth? Explain your thinking.
3. The Ogallala Aquifer under the Great Plains spreads across 174,000 square miles. It is under parts of eight states. Research to discover: How is this aquifer super-important to agriculture?

Did you know? *Minnesota has the most water resources of the 48 connected states. We have more shoreline than any state except Alaska!*

Try this! *Make an Aquifer in a Tank.*
www.beg.utexas.edu/education/aquitank/tank01.htm

Try this! *Awesome Aquifers*
www.groundwater.org/kc/activity8.html

BLOOM and GROW!
Adventures in Gardening

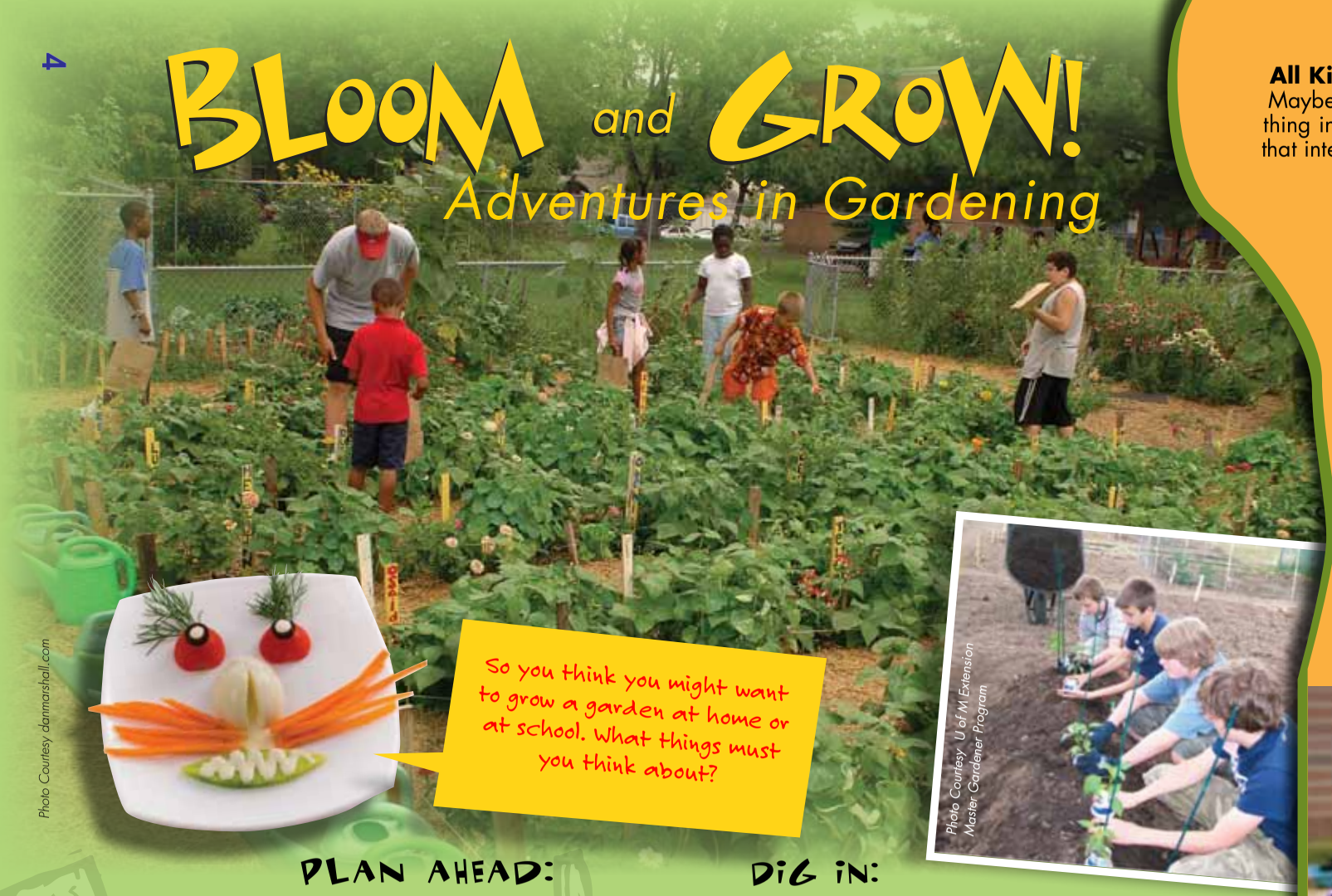


Photo Courtesy dannarshall.com

So you think you might want to grow a garden at home or at school. What things must you think about?

Photo Courtesy U of M Extension Master Gardener Program

PLAN AHEAD:

1. Do you have a space for a garden? Pick a spot. It can be a plot of soil, a window box, a big container or even a group of flower pots.
2. Growing plants need soil, moisture, heat and light. How can you provide each of these?
3. What will you want to plant? What grows in your space, soil and type of weather?
4. What do you need to buy? Tools? Seeds or seedlings? Plant food? Soil? What else?
5. When will you need to start your garden to allow enough time for plants to mature?
6. What daily or weekly tasks must gardeners do? Will you need help? Who can help you learn what you need to know?
7. Anything else?

DIG IN:

1. Prepare the soil. What do you need to do? Do you need to add anything to make your soil healthier for growing plants?
2. Plant! Directions on your seed packages will guide you. How big will each plant get? How much space does each plant need? How can you make your garden colorful and attractive? How can you pair plants that do well together, or mature at different times? (Packages tell you how many growing days are needed.)
3. Label the rows so you remember what's planted where. As they grow, you'll learn to recognize each type of plant.
4. Water, weed and watch your garden. Observe and learn. Are plants thriving? Are some plants wilting? Is there any pest damage? Ask for help when you need it.

All Kinds of Gardens!

Maybe you'd like to grow just one type of thing in your garden. Check theme gardens that interest you.

- ☐ Just flowers
- ☐ Vegetables
- ☐ Native plants
- ☐ Salsa ingredients
- ☐ Berries
- ☐ Herbs
- ☐ Salad greens
- ☐ Plants to attract butterflies or hummingbirds
- ☐ A "Three Sisters" garden with corn, beans and squash—like the Native Americans taught the settlers
- ☐ An A to Z garden, with something for each letter of the alphabet
- ☐ A garden of just one color

Gardens are Good for You!

You will:

- get exercise and fresh air
- improve nutrition through really fresh food
- learn about ecosystems, plants and growing things
- _____
- _____

Gardening is a business for some growers. Visit a farmers' market and you'll meet them.
Photo Courtesy Minnesota Grown Program

HARVEST AND ENJOY!

How will you clean, prepare, cook and serve your food? Do you have extra produce to share?

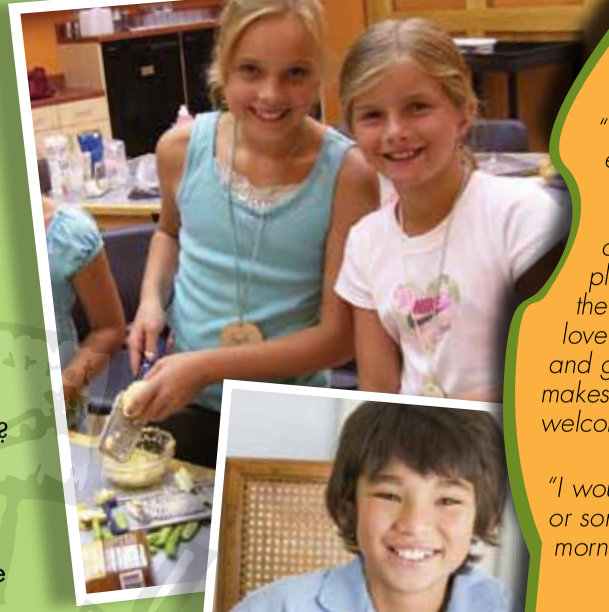
AFTER THE HARVEST

Imagine it's the end of the gardening season. Think about this: Were your expectations met? What were some surprises? What might you do differently next time you have a garden?

Lots of great help is just a mouse click or a phone call away. Check out the library, or check out the Web.

ON THE WEB

www.kidsgardening.com



Why grow a garden?

"I would grow a garden to experience the thrill and excitement of feeding the plants, and eating your own food. Seeing your plant sprouts growing toward the light is inspiring, and unique! Also, I love the thought of eating your own food, and gardens are very pleasing to the eye! It makes our front and backyard look and feel so welcome.

"I would like to have a squash, like a pumpkin or some brightly colored one, daisies, peapods, morning glories, strawberries, and carrots."

Anna K., Grade 6, Seward Montessori, Minneapolis

Hungry Planet:

What the World Eats

Explore this exhibit and special events through May 9, 2010! Bell Museum of Natural History, University of Minnesota

ON THE WEB

www.bellmuseum.org

Locavore Kids!

Some of Minnesota's school cooks are onto a good thing! Around the state they are working to get more locally grown items on their lunch menus. They seek out, buy and serve corn, bison, beets, honey, cheese and other foods raised right in their home area. It's called farm-to-school purchasing. Five years ago, Willmar was one of the first cities to get on board. Is it happening in your school? What would be the benefits? What foods from your local area would you like on your school lunch tray?

A WHITE HOUSE GARDEN

Have you heard about First Lady Michelle Obama's White House Garden? It was the first such garden there since Eleanor Roosevelt had a "Victory Garden" nearly 70 years ago. That was during WW II, when American children helped with family victory gardens. These backyard plots provided much of the nation's food supply during wartime.

Fifth-graders from Bancroft School near the White House helped Mrs. Obama. They helped prepare the plot, plant the crops and harvest the produce. They even cooked some of the food in the White House kitchen. They learned what "fresh" tastes like. The 1,100-square-foot plot was about one-fourth the size of a basketball court. It grew more than 1,000 pounds of sweet potatoes, tomatoes, eggplant, broccoli, fennel, lettuce and other vegetables and herbs. White House and visiting chefs cooked them to feed the Obamas and guests. A nearby beehive, bolted to the South Lawn to withstand wind from the president's helicopter, produced 134 pounds of honey. It all sounds awesome, healthy and delicious!

Photo Courtesy U.S. Department of Agriculture

FIND OUT MORE! The Story of the White House Garden
www.whitehouse.gov/blog/The-Story-of-the-White-House-Garden/

Organic

Visit any grocery store or farmers' market today and you will find foods labeled "organic." More organic products appear in supermarket aisles each year. But what is organic food? Why is it becoming more popular with both farmers and food shoppers?

Packaging organic salad mix
Photo Courtesy University of Minnesota Agricultural Experiment Station

or·gan·ic This word is a promise about how a food was grown and handled before you choose it from the shelf. Organic farmers use **biology** and **ecology** to grow crops and livestock. They don't use synthetic (human-made) weed killers, insecticides, fertilizers or genetically modified seeds. They must promote **biodiversity** on their farms. Organic farmers must also protect soil and water from **erosion** and **contamination**.

Conventional and Organic Farming: What's the Difference? Non-organic (conventional) farmers might spray commercial weed killers on their crops. Organic farmers use different methods for weed control. Organic farmers rotate crops, planting something different each year for four or five years. This makes it harder for weeds to thrive. Organic farmers may also mow or mulch, which cuts or smothers weeds. They may use tractor-pulled cultivators, tillers or propane weeders, which use jets of flame to control weeds. In delicate crops, they may pull weeds by hand.

Organic meat, poultry, eggs and dairy products come from animals that eat organic feed. These animals must also be allowed to go outdoors. Cows, sheep or goats must be allowed to pasture graze, which is a natural behavior for them. In the United States, no organic animals may be given medicated feed, antibiotics or artificial hormones.

Why Organic? Every farmer who grows organic sees some benefit to it. Different farmers have different reasons. Some like the challenge of farming with nature. Others don't like to buy or use synthetic chemicals. Price is also important. Organic farmers are usually paid more for their crops and livestock.

How about shoppers? Why do they choose organic? Some don't like the idea of pesticide or herbicide residues on foods. Others consider organic farming better for the environment. Still others say they think organic food tastes better. Some think organic is stylish. Are organic and conventional foods any different nutritionally? Experts are debating and researching.

USDA ORGANIC

You can't just put the word "organic" on anything. To protect organic farmers and consumers from fraud, the U.S. Congress passed a law defining what "organic" means. This sign means that the item was raised in line with that law. The farm was inspected to make sure the farmer was following the rules.

Think and Discuss

1. Do you or people you know eat organic food? What are the reasons?
2. How might a family garden produce organic foods?
3. How does your family decide what food to buy?

Minnesota AgBrags

- We have more than 600 certified organic farms. They grow cereal grains (such as wheat, oats, and barley), corn, soybeans, dairy cows, chickens, fruit, vegetables, herbs and even maple syrup! Some farms are up to 3,000 acres and some are just an acre or two.
- We have more than 200 Minnesota food companies that process organic milk, pasta, salad mix, oatmeal, cookies, chips and more.
- Minnesota ranks in the top ten states in the USA for organic farms. We're 7th. Who's first? California

Source: US Department of Agriculture, 2008

Our Bountiful Land: The Story of Food
1970-2010

Minnesota's food story since 1970 has meant big changes for producers, processors and all of us.

Bigger Farms
Farms keep getting larger. Modern technology and machinery help make that happen. Today's poultry farmers can raise thousands of turkeys or chickens on one farm. One dairy farmer might have 500 or more cows. Crop farmers can plant and harvest hundreds of acres of corn, soybeans, wheat and more.

Science Discoveries
Scientists play a big role in today's food industry. Think about some of their amazing work: new plant varieties; plants that can resist pests, diseases or drought; animals that are healthier and leaner; new ways to keep the food supply clean, fresh, safe and healthy.

World Markets
Improved storage, refrigeration and transportation means foods come to us from markets all over the world. Strawberries from Mexico can be picked in the morning and sold in our stores the same day.

Farmers' markets offer us hundreds of fresh foods throughout the growing season.

Photo Courtesy University of Minnesota Agricultural Experiment Station

Contributions from Newcomers
Minnesota is home to many new immigrants. They include people from Southeast Asia, India, Latin America, Mexico, Somalia and many other nations. Many newcomers moved to small towns and rural areas to work in agriculture. From fields to processing plants and grocery stores to restaurants, immigrants make huge contributions to our food industry every day.

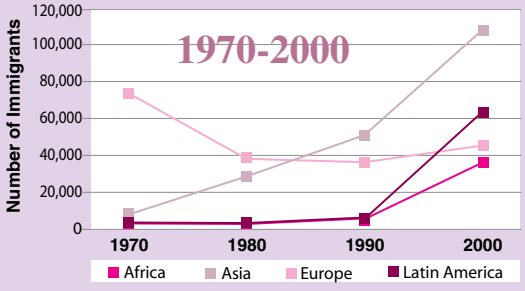
New Menus, New Choices

Each group of newcomers brings their own tasty foods, flavors and traditions. That means more choices for all of us! Today's supermarkets are packed with thousands of foods for us to choose from besides the locally grown. Some stores have whole sections of food from countries around the world. You can pick up the fixings for Chinese chow mein, Mexican tacos, Asian stir-fry, Thai peanut sauce or Indian curries in one-stop shopping. Not only are there more food choices, there are more places to buy food. You can buy food in farmers' markets, co-ops or directly from a favorite farmer. You can even shop online and have food delivered to your house. What would the pioneers think?

Which foods from other parts of the world do you like to eat?

Think and Discuss:

Immigration Trends into Minnesota



Source: **Northern Lights**

1. From where have most of the immigrants in Minnesota come in the 1900s?
2. Which years have shown the most immigration?

Fast Fact:

In 2007, about 10% of Minnesota's residents were immigrants and their U.S. born children under age 18.

Source: Center for Immigration Studies

AgMag Grab Bag

Celebrate Minnesota Water

Label these 8 rivers

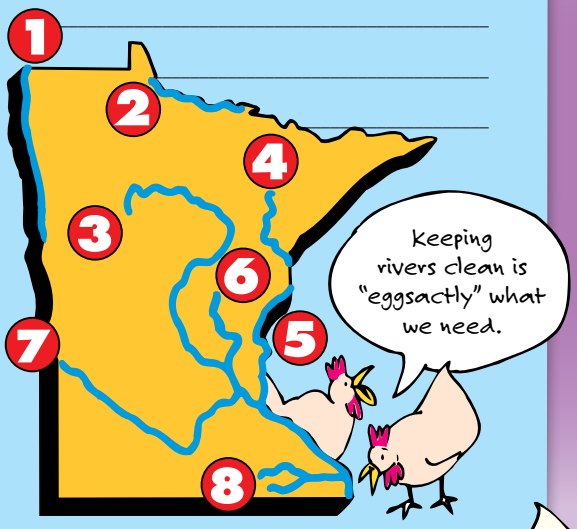
- ☐ Minnesota
- ☐ Mississippi
- ☐ St. Croix
- ☐ Red
- ☐ Rainy
- ☐ Rum
- ☐ St. Louis
- ☐ Root

How can ***you*** help protect our rivers?

_____

_____

_____



HOME Connection

Make a list of all the ways your family uses water in a week. Then guess how much water it is in gallons.

Next, find your family's water meter. Take a notepad and jot down the date, time and the numbers on the meter. (A parent can help you read the dials. The water is measured in cubic feet. One sweep-hand revolution is one cubic foot of water.) Read the meter again after one week and see how your prediction checked out.

One cubic foot of water is about 7.5 gallons.

Date_____Time_____No._____

Date_____Time_____No._____

GLUG-GLUG

How much drinkable water do people use each day?

Average Person	Gallons
American	90
European	53
Sub-Saharan	3-5

Why is there such a big difference?

It takes three liters of water to produce the plastic for a one-liter container of bottled water. It takes over 1.5 million barrels of crude oil to produce the plastic for bottled water sold in the U.S. each year. That's enough to fuel 100,000 cars for the year. Many bottled waters come from city taps. Why not save your plastic bottle and fill it with your own good tap water?

If H2O is water, what is H2O4?

A. It's for washing your hands!

What is Arbor Day?

When is it?

Date_____

Did you know?

There are **6.7 billion** people in the world today. Which countries do you think rank first, second and third?

Answers: 1. China **2.** India **3.** United States

For Seven Generations...

When making an important decision, an 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?

_____

_____

Think Green

Green Squad

Is your school a safe, healthy place that doesn't hurt you or the environment? The kids on the Green Squad know how to find out! They have a mission for you.

ON THE WEB www.nrdc.org/greensquad/intro/intro_1.asp

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