AgMag
Volume 23, Issue 3 2008/2009
The Magazine of Minnesota Agriculture in the Classroom

Celebrating Our Natural Resources

What natural resources can you name in this picture?

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?

What connections to agriculture do you see in this photo?

Thanks to immigrants, we enjoy a wide variety of foods. What is this vegetable? See page 7.

Celebrating our Natural Resources

What natural resources are these kids enjoying? Besides humans, what or who else benefits from healthy soil, air and water?

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 earthworms and other living things helpful to plants

Without it, life on Earth 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 have a big role to play. But each of us must also help. These soil care tips are things we all can do:

1. Plant grass or flowers in bare soil 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?

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

Our Actions Matter!

How do the things we buy affect the water, air and soil we depend on? Visit this website and find out how our interaction with these resources affects Earth now and for years to come.

www.pbs.org/pov/borders/2004/index_flash.html

Where's Your Basin?

You may not know it but you live in a basin! A **drainage basin** is the area of land drained by a river or lake and its tributaries. Minnesota has 10 major drainage basins. Each basin is made up of smaller units called **watersheds**—areas of land from which rain and melted snow trickle down to the lowest point … a stream, river or lake. Some water flows over the top of the land (surface water); other water flows underground (ground water).

- In which drainage basin do you live? _____
- In which rivers, lakes and ocean does the water from your basin end up?
- Explain: *"We borrow water! We get it from someplace, we use it, then send it somewhere else."*

For more on basins go to:

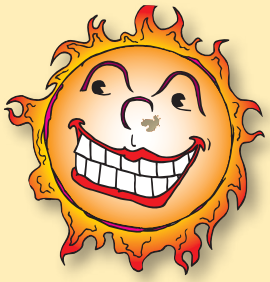
www.pca.state.mn.us/water/basins/index.html

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!

Make up a rhyme that uses the words CARE and AIR.

_____

_____

_____

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 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?

What do you know about water?

1. About two-thirds of the human body is water. People can live without any food for several weeks, but many would survive ___ without water.

a. 1 month **b.** 2 weeks **c.** less than a week

2. More than 40% of the fresh water in the United States (and 10% of the world's) is in this lake.

a. Long Lake **b.** Lake Superior **c.** Lake Wobegon

3. In a lifetime, you will drink enough water to fill more than ___ liter bottles.

a. 40,000 **b.** 100 **c.** 500,000

Don't miss this COOL watercycle website:
www.epa.gov/safewater/kids/flash/flash_watercycle.html

Photo Courtesy University of Minnesota Agricultural Experiment Station

Water Watch

Even in water-rich Minnesota, it's a big job to keep water clean, usable and available. Five million Minnesotans depend on our waters.

A new law, called the Great Lakes Compact, helps us protect the water in our largest lake: Lake Superior. After ten years of planning, President Bush signed the Compact into law in October 2008. The pact is an agreement among the eight Great Lakes states and two Canadian provinces. It regulates the use of Great Lakes and St. Lawrence River water. The states and provinces depend on the water for drinking and recreation, commercial shipping, industry, fishing, tourism and more.

The new law gives power to protect Great Lakes water from being sent to thirsty areas far away. But the states and provinces must also make sure they use the water wisely. The Great Lakes contain over 20% of the world's fresh surface water.

How's Your Geography?

Name the eight states and two provinces that border the Great Lakes.

_____

_____

_____

Home Grown Energy

Every day, Americans need energy (fuel). Heating homes and businesses, cooking food, running industry, powering cars, planes, trains: it all takes energy. Energy comes from fossil fuels such as coal, natural gas and oil (petroleum). Fossil fuels start out as decayed plants and animals that turn to crude oil deep in the earth.

The sun is the primary source of the earth's energy. What happens when supplies of coal, natural gas and oil are used up? It takes millions of years for them to form again. To us, they are not renewable. They are gone for good.

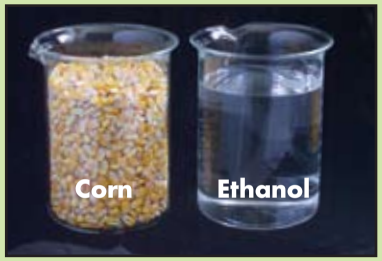
Many geologists predict the world will begin to run short of oil in this century. We need to find renewable ways to create energy. Agriculture and science are teaming up to do just that.

Energy From Plants

Corn Power

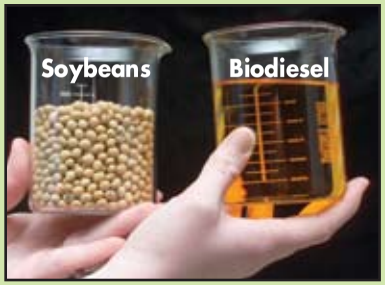
Wouldn't it be great if we had a fuel that causes less air pollution than gasoline, is easy to make here in Minnesota and is renewable? The good news is we do have such a fuel! Ten percent of the gasoline you pump into your car is **ethanol**, made from corn. Ethanol production helps Minnesota farmers, businesses and communities. It can:

- Help cut air pollution. Ethanol burns cleaner than gasoline.
- Provide jobs at ethanol plants.
- Replace 10% of imported crude oil used to make gasoline. That saves both oil and money.
- Create new markets for the state's largest crop —corn. Corn growers earn money selling their corn to the ethanol processing plant. Many ethanol plants are owned by the growers themselves in businesses called **cooperatives** (co-ops). Co-op growers also share in the income when the ethanol is sold.



Photos Courtesy University of Minnesota Agricultural Experiment Station

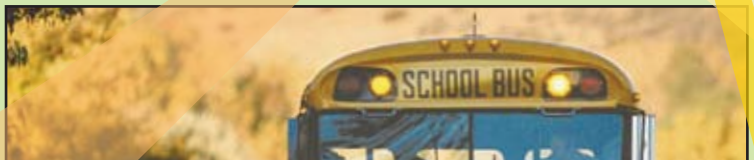
Beans in your Bus!



Photos Courtesy University of Minnesota Agricultural Experiment Station

Is there a long line of buses waiting to take students home when your school gets out? If so, you may notice the smell of diesel exhaust in the air. Many big, powerful engines burn diesel fuel. Breathing diesel smoke is not good for our lungs and hearts, or for our environment. Agriculture is helping clean the air by producing **biodiesel** fuel for engines in buses, trucks, tractors and some cars.

Biodiesel is an environmentally friendly fuel. It burns much cleaner than fuels made from oil. In Minnesota, most biodiesel fuel is made from soybeans, which are high in oil. Like ethanol, biodiesel fuel is renewable because it comes from crops that can be re-grown every year.



About one-fifth of Minnesota's corn crop is used for ethanol. If ethanol causes high demand for corn, what happens to the price of corn? Cattle, hog and poultry farmers need corn. Many food processors need corn, too. What do higher corn prices mean for them and for us?

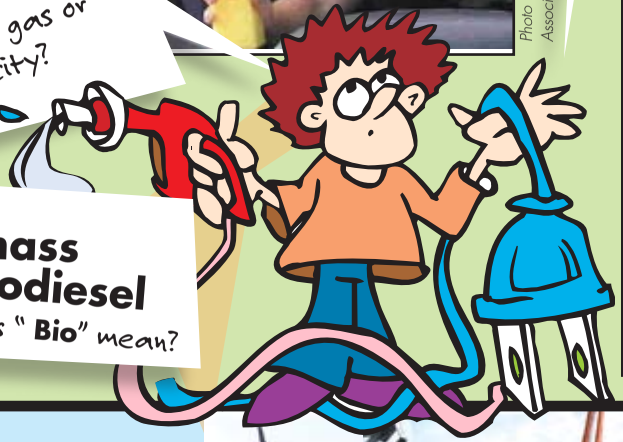
Photo Courtesy American Lung Association of Minnesota

Watch for E85 at more gas stations. It's an 85% ethanol fuel from corn.

Photo Courtesy Minnesota Soybean Council

What would your life be like without energy from gas or electricity?

Biomass
Biodiesel
What does "**Bio**" mean?



Biomass

World demand for both food and fuel is expected to double in the next 50 years. Look for fuel made from the fiber of sticks and trees, prairie grass, wheat straw, cornstalks, sugar cane, paper pulp, rice hulls and even garbage!

Photo Courtesy Agricultural Utilization Research Institute

Did you know?

- Ethanol is made from other high-starch crops besides corn. Soybeans, sugar cane, sugarbeets, potatoes and even cheese whey are some of the others.
- Ethanol is Minnesota's biggest renewable energy industry. We have 18 ethanol plants now.

Harvesting the Wind

Turbines turning gently in the wind. Huge turbine parts are made in the U.S. and other countries. They are both exported and imported through the Port of Duluth. Turbine towers travel by truck from the port to the wind farm.

Photos Courtesy Duluth Seaway Port Authority

If you live in southern Minnesota or have visited there, it's a sure bet you've noticed the wind. It seems to blow all the time! Scientists and farmers took notice. Some farmers across southern Minnesota added wind to what they produce. Many fields with crops now hold towering wind turbines. The wind power generates electricity, which is sold to communities in the area. Wind power is a fast-growing business in Minnesota. We are fourth in the nation in wind energy production. Minnesota's wind turbines now produce enough electricity for over 560,000 average households.

State law says 25% of our electricity must come from renewable resources by 2020. Xcel Energy's new Grand Meadow Wind Farm began selling electricity in December, 2008. It's located east of Austin, Minnesota. Look for more wind farms in other southern Minnesota counties and even in the Twin Cities metro area.

- How are decisions made about where wind farms should be located?
- How does electricity move from the wind turbine to the businesses and communities who buy it?
- Why is it an advantage to have wind farms near large population centers when possible?
- How does wind-generated energy save water? Reduce air pollution?

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 usually earn more for organic 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.

Our Bountiful Land: The Story of Food
1970-2009

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.

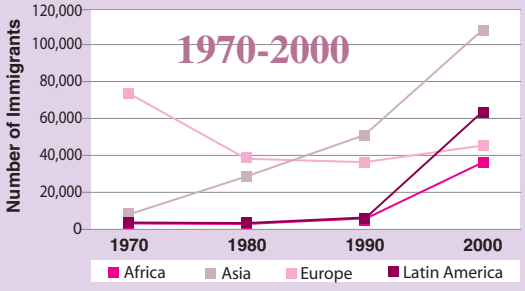
New Menus, New Choices

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?

The vegetable in the cover photo is boc choy.

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. What foods do you enjoy that came to us through immigrants?

Fast Fact:

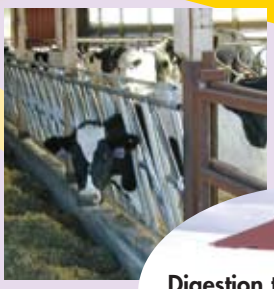
In 2007, about 10% of Minnesota's residents were immigrants and their U.S. born children under age 18.

(Source: Center for Immigration Studies)

GRAB BAG

POOP Power

Habenschield Farms near Princeton was the first Minnesota farm to use cow manure (poop) to produce electricity. Over 800 cows on the farm produce about 20,000 gallons of manure every day. The manure is scraped from the barn, along with recycled newspapers that are used for bedding for the cows. It's mixed until smooth, and then pumped into a huge covered digestion tank. There it heats up and gives off methane gas. The gas is burned by an engine that drives a generator that creates electricity. The manure, now a lot less smelly, empties into a storage lagoon. Later, it is spread on cropland as fertilizer. Why do farmers use fertilizer?



The farm's poop power makes enough electricity to run the whole farm and 70 other households!

Photos Courtesy University of Minnesota Agricultural Experiment Station

Digestion tank

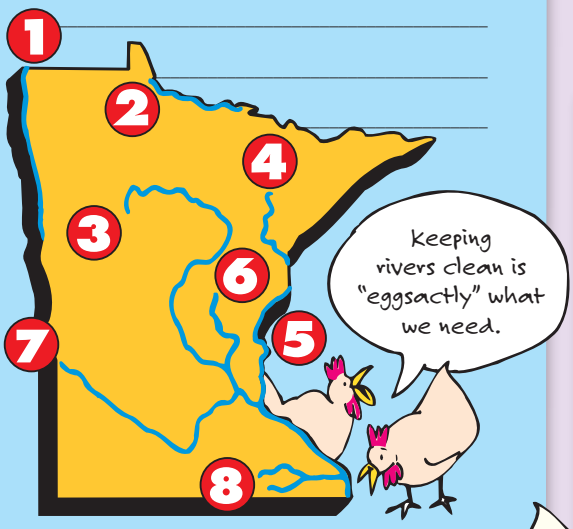
Storage lagoon

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. 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. Is it gallons, cubic meters or cubic feet?) Read the meter again after one week and see how your prediction checked out.

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

The Minnesota AgMag is a publication of Minnesota Agriculture in the Classroom, 625 Robert Street North, St. Paul, MN 55155. The program is a public/private partnership between the **Minnesota Department of Agriculture** and the **Minnesota Agriculture in the Classrom Foundation**. Statistics courtesy U.S. Department of Agriculture and Minnesota Agricultural Statistics Service. Printed in the U.S.A.

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