agMAG

CONNECTING YOU TO NEBRASKA AGRICULTURE

Issue 4

OUR RESPONSIBILITY:
NEBRASKA'S NATURAL RESOURCES

A natural resource is something that is found in nature and can be used by people. Every place on earth has its own unique group of natural resources. Nebraska is rich in natural resources. Not just people need and use them. Plants and animals on farms and ranches need natural resources to live.

SOIL

Soil holds water and nutrients plants need to grow. Animals and people depend on plants for food, so we all need soil!

SUN

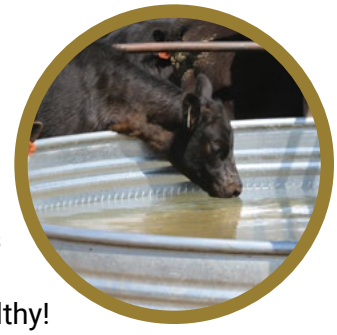
The sun is a source of energy for all life. Plant leaves take in sunlight to make food and energy to grow. Farm animals eat plants. People can eat both plants and animals, so the sun gives us energy too!

AIR

Plants, animals, and humans need clean air to live. Plants take in carbon dioxide that we breathe out. Animals and humans breathe in oxygen that plants release.

WATER

People, plants, and animals all need plenty of clean water to grow and stay healthy!



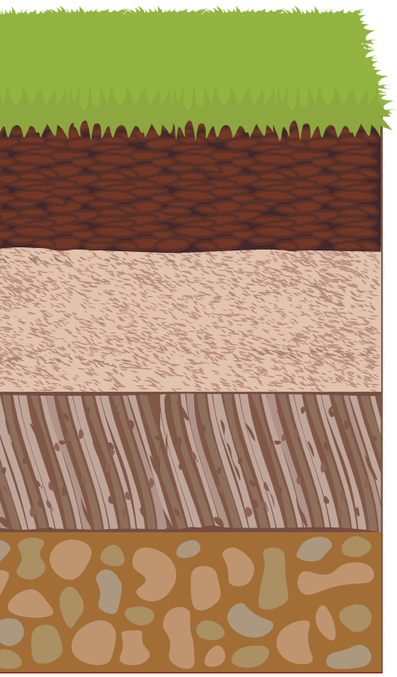
THINK AND DISCUSS...

Agriculture depends on natural resources, and we depend on agriculture! Why is it important for farmers and ranchers to care about natural resources?

NEBRASKA SOIL – IT IS MORE THAN JUST DIRT

Soil is necessary for plants, animals, and humans to live. Did you know that soil is the surface of the earth, and what is underneath it is valuable too?

Farms and ranches need soil to grow plants. Soil holds the roots in the ground so plants don't fall over. It also helps plants absorb moisture, and it provides nutrients plants need for food.



WHAT'S UNDER OUR FEET?

There are different levels of soil underground! Check out what is below the surface. Using context clues, write the correct term from the word bank in the blank for each layer in the soil profile.

This top layer, _____, contains decomposed organic matter like leaves and branches.

Bedrock

Known as _____, this dark-colored layer is where seeds germinate and roots grow. It contains a mix of minerals and organic matter.

Subsoil

This layer is mostly sand and silt. This is due to the process called _____, where minerals and clay are moved downward when water drips through the soil.

Humus

This layer, _____, contains clay and minerals like iron and aluminum.

Topsoil

_____: the make up of this layer is mostly broken up rock.

Leaching

AGRICULTURE PROTECTS THE SOIL

CAREER SPOTLIGHT

Andy Jobman started Jobman Agronomics, an independent agronomy business that helps farmers make good decisions about how they use water and soil.

Andy takes soil samples for farmers each year to determine the right amount of fertilizer to apply, and he monitors the health of the soil. Andy says, "Just like we treat others how we want to be treated, we must treat our soil and water with care so they are safe and reliable and benefit the next generation."

SOIL SCENES

- The texture of soil is described as sand, silt, or clay. Texture can be described as how soil feels to the touch.
- The texture also determines what type of plants and crops will grow in it.
  - Areas in eastern Nebraska have more clay in the soil, which holds moisture—good for raising corn and soybeans.
  - Parts of central and western Nebraska are called the Sandhills. The soil is sandy and doesn't grow crops like corn and soybeans. Instead, ranchers raise lots of cattle which graze on the grasses and hay produced there.
- The texture of soil determines how fast water goes through it:
  - Sand = **fast**
  - Silt = **medium**
  - Clay = **slow**

WATER – YESTERDAY, TODAY, AND TOMORROW!

Are you ready for this? The water in your shower this morning is the same water molecules that dinosaurs waded in! The water we use today is the same water that has been recycled since the earth was formed. There will never be any MORE water, and that is why we need to keep our water clean. We want it to be safe for humans, animals, and plants to use now and in the future.

WHERE DOES OUR WATER COME FROM?

We need water every day and agriculture does too! Plants need it to grow, and animals need it to live. But where does 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. Groundwater is water that exists underground.

NEBRASKA'S AQUIFER!

One of Nebraska's most vital natural resources is its massive supply of groundwater. **The Ogallala Aquifer** water resource is located under nearly two-thirds of Nebraska. It provides water to irrigate agricultural land and also makes up about 80% of the water we drink.

AGRICULTURE PROTECTS WATER

CAREER SPOTLIGHT

Matt Lukasiewicz is the General Manager for the Loup Basin Reclamation District, Farwell Irrigation District, and Sargent Irrigation District, which are projects that started in the 1930s to provide flood control and irrigation for crops. Today, the systems store water in the Sherman Reservoir to help the aquifer and provide recreation benefits, irrigation for farm land, and better habitat for fish and wildlife. Matt shares, "Water is the most valuable resource we have. Without it, we cannot exist. If you truly care about the future and preventing world hunger, consider working in the water and conservation industry to help the entire world."

HYDROLOGIC CYCLE

The Earth recycles the same water over and over. This process is called the hydrologic cycle. Water changes forms: from solid to liquid to gas, over and over again.

COOL WATER FACTS!

Let's see how much you know about water! Fill in the blank with the correct answers on the bottom.

Water covers about _____ of the Earth's surface.

_____ of the Earth's water is salt water. 2.8% is freshwater for human and animal needs.

Nebraska's longest river is the _____ which creates the eastern border of Nebraska.

Water from 31 states drains into the _____ River.

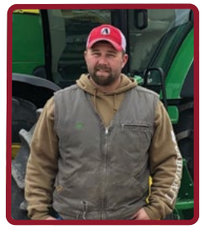
A _____ is the area of land that water drains off of and into a lake or stream.

The Earth recycles the same water over and over through a process called the _____ .

WATERSHED	70%	MISSOURI
HYDROLOGIC CYCLE	MISSISSIPPI	97.2%

NEBRASKA FARMERS AND RANCHERS TAKING CARE OF NATURAL RESOURCES

Farmers and ranchers in Nebraska keep our natural resources in good shape. That way, they can continue to provide us with agricultural products we eat and use every day!



Shane Greving

Shane Greving is a 5th generation farmer. He works with his dad and brother on the family farm. They have 5,000 acres of corn, including seed corn and popcorn, and soybeans.

Shane uses many conservation practices at his farm. All of the soybean acres are planted no-till. They use crop rotation and plant soybeans into the standing corn residue (what is left of the plant/stalk after harvest). They plant corn acres using strip-till. Both methods reduce soil erosion, conserve moisture, and help control weeds.

All of their land is irrigated. According to Shane, subsurface irrigation is the most efficient use of water, as there is no evaporation because the water is all underground.

Greving's family also uses cover crops, including rye, turnips, and radishes. The cover crops use any excess nutrients in the soil to prevent them from going into groundwater. They also retain more moisture in the soil, which reduces the amount of irrigation needed. The soil builds up through the nutrients and organic matter, which reduces the amount of fertilizer needed on the soil.

AGRICULTURE AND CONSERVATION TERMS

Farmers and ranchers use a variety of methods to protect and care for the land. Here are a few:

CROP ROTATIONS - Farmers don't plant the same crop in the same place each year. This keeps the soil from being depleted of nutrients.

GRAZING ROTATIONS - Ranchers don't let their livestock graze in the same pasture all the time. This manages the quality of soil and amount of water needed.

NO-TILL - Seeds are planted in ground without plowing or disturbing the soil. This conserves moisture and helps with weed control.

STRIP-TILL - Farmers work or till a small strip where seeds will be planted. There is less erosion and fertilizer/nutrients can be applied directly in the strip.

COVER CROPS - Crops grown to protect and enrich the soil. They are planted in the off season before fields are needed for crops (like corn!).

IRRIGATION - Applying water to land. There are three basic types:

Flood irrigation: water is delivered to field by ditch or pipe and flows over ground through the crop

Center-pivot irrigation: equipment rotates around a pivot, and crops are watered with sprinklers

Subsurface (drip) irrigation: uniform application of small quantities of water at spaces below the soil surface.

Alec Ibach

Alec Ibach is a 5th generation rancher. He runs his family's 1,000-head cow-calf ranch near Sumner and has pastures near Purdum. Care of the cattle and conservation of land and water are very important to Alec.

Alec uses grazing rotations in the summer to better utilize natural resources. His pastures are located in two different ecosystems. He must graze them differently for conservation.

WHAT'S AN ECOSYSTEM?

An ecosystem includes all the living plants, animals, and other organisms in a given area. They interact with the weather, sun, soil, and climate.

> ***"We use good grazing habits and conservation because it is good for the animals and more sustainable for the long-term. By maximizing the use of our land and water, we will sustain it for future generations."***

Land near Purdum is in the Sandhills, which has sandier soil. Alec rotates cattle through a section of pasture there every two weeks. It better utilizes nutrients, avoids overgrazing, and prevents blowouts. A blowout occurs where cows eat all the grass and there is no vegetation to hold soil in place, so erosion can occur. Pastures near Sumner are in south central plains and have more silt in their soil make-up, so sections can be grazed longer. Grazing rotations keep grass and vegetation healthy and growing, which prevents soil erosion and helps retain moisture in the soil.

Grazing rotations improve wildlife habitats and increase the populations of grouse, prairie chickens, and pheasants. Birds and other wildlife often drink water out of the cattle tanks.

CAUSE AND EFFECT

Have you ever heard of "cause and effect"? It is when something happens (cause) and makes something else happen in response (effect).

Read the information on these two pages again. Then, list two examples of cause and effect that are described in the text. An example might be: Subsurface irrigation delivers water underground (cause). That way, there is less water evaporation (effect).

Cause _____

Effect _____

Cause _____

Effect _____

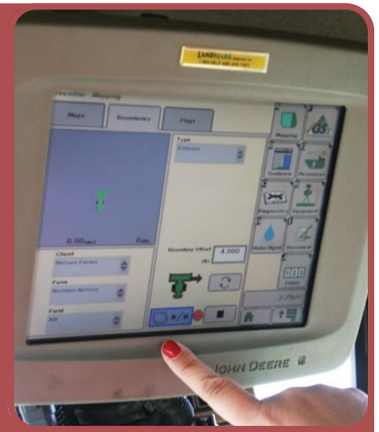
HIGH-TECH WAYS TO PROTECT SOIL AND WATER

It's probably no surprise that technology is used to protect Nebraska's soil and water. Nicole Leonard is a Customer Technology Specialist with Landmark Implement and works with customers around Kearney and Shelton. She assists farmers with technology and systems used to help conserve soil and water. Check out the technology many farmers are using and that specialists like Nicole work with every day!

GPS

Global Positioning Systems (GPS) allow farmers to get data about their fields. Tractors have **receivers** that get information from satellites about fields and **displays** allow farmers to access information. Before GPS technology, farmers would make planting and fertilizing decisions based on a whole field, in acres, or a large part of it. Because of GPS technology, farmers can focus on **inches** of a field instead of feet! Receivers and displays get specific in what they tell a farmer about his or her field!

RATE CONTROLLERS



Rate controllers vary the amount of product (example: fertilizer that provides nutrients) applied to different parts of a field. Farmers then only apply what is needed in a specific area. This helps avoid two things:

Underapplication, or not enough, can deprive soil of nutrients it needs to support the crop growing.

Overapplication, or any excess product not used, could travel down through the soil and into the groundwater supply.

IRRIGATION TECHNOLOGY

Monitoring units at the end of center pivots alert farmers if the pivot is working incorrectly and how much water it is putting out. The units are controlled by smart phone apps which allow farmers to control exactly how much water is applied. This avoids over- or under-applying water to the field.

Farmers also use moisture probes. These are placed into the ground and monitor the water supply every 4 inches down to 4 feet. This helps farmers make adjustments in how much to irrigate!

NEBRASKA–HOME FOR IRRIGATION!

Did you know that 4 of the top 10 irrigation companies in the world are headquartered in our state?

They are: **Valley**, **Zimmatic**, **Reinke,** and **T-L**.

Research to find out more!

- What cities are these companies located in?
- How does each company use technology in their equipment?

NEBRASKA SOYBEANS

CONSERVING SOIL & WATER

Nebraska ranks 4th in soybean production in the United States. Soybeans are part of our everyday lives. They are used for animal feed, fuel, food, and everyday products. Let's explore how Nebraska farmers efficiently use water and manage the soil to grow soybeans that are used all over the world!

SOYBEANS–A VITAL PART OF SOIL!

Soybeans are a legume. That means they have nodules which contain bacteria on their roots. The bacteria on the nodules take nitrogen from the air and fix it into the soil so soybeans and other plants that require nitrogen can use it to grow. Nebraska soybean farmers practice crop rotation, the practice of growing different crops on the same land. In this process, soybeans use the nitrogen they produce, and they leave some nitrogen in the soil, which can be used by plants that cannot make nitrogen – like corn – in the next crop rotation.

WATER - HELPING SOYBEANS FEED THE WORLD

Soybeans are used all over the world! The demand for soy was 284 **metric tons** in 2013-14, and it is estimated to grow to 350 million metric tons by 2023-24! That's a lot of soybeans to produce! How do Nebraska farmers help meet that demand? One way is by managing how much water soybeans need to grow.

Water naturally occurs in the form of rain. In some areas of our state, soybeans also receive water through **irrigation**. The overall goal of farmers is to minimize the amount of water needed to produce the most crops—conserving water AND producing a lot of soybeans.

WHAT IS A METRIC TON?

Agricultural products (like soybeans!) are often traded to other countries in metric tons. A metric ton is a unit of weight equal to **1,000 kilograms** (2,205 pounds).

If 1 metric ton = **2,205 pounds**, how many pounds are in 5 metric tons? Show your work below:

NATURAL RESOURCES CONSERVATION – TAKE ACTION!

Do you have an interest in soil or water and conserving Nebraska's natural resources? You can take action by exploring career opportunities in natural resources!

Austin Baldwin
Hartington

Austin Baldwin is a soil conservationist with the Natural Resources Conservation Service. Austin helps farmers and landowners identify conservation needs on their land. He looks for issues like soil erosion and health, water pollution, and where shelterbelts could be effective. Austin uses aerial images and other technology to advise farmers on solutions. He follows up with landowners to see how recommendations and practices are working. Sometimes it can take three to five years to see results. He shares, "It is important to conserve soils and make sure our water quality is good for future generations. We need to conserve resources today to avoid issues down the road."

Dana Divine
Lincoln

Dana Divine is a survey hydrogeologist with UNL's Conservation and Survey Division. She is a "groundwater detective!" We can't see groundwater or the rocks and sediments water moves through (the aquifer) because it is underground. Dana collects clues from wells and finds a pattern to determine the direction water is moving and where it enters and leaves. Dana shares her findings through writing "stories" that include the history of aquifers and current findings. She strives to make it interesting for people to learn about and makes it easily accessible online. Dana shares that if you are interested in a career in water, there are many aspects: geology or engineering if you like math and science, or law, art, or photography if you are interested in the human aspect. Find what interests you!

Farmers and ranchers take action every day to conserve Nebraska's natural resources! Check the box to show how you can take action to conserve soil and water, too!

What Farmers & Ranchers Do

- ✓ Apply specific amounts of water to fields to help plants grow
- ✓ Use rotational grazing for cattle to keep soil healthy and in place
- ✓ Irrigate with subsurface irrigation to prevent water evaporation
- ✓ Plant cover crops to protect and enrich the soil

What My Family, Friends, and I Can Do

- ☐ Take a shower (uses less water than a bath!)
- ☐ Keep grass healthy—fertilize with appropriate amounts
- ☐ Water lawn in early morning—helps prevent water from evaporating
- ☐ Plant a garden or flowers in empty spaces to protect the soil

DIGGING DEEPER

Make a list and share it with your family!

- What are other natural resource careers in Nebraska?
- What career areas interest you?
- What are additional daily activities you and your family can do to conserve natural resources?

Nebraska Agriculture in the Classroom is a program of the Nebraska Farm Bureau Foundation whose mission is to engage youth, educators, and the general public to promote an understanding of the vital importance of agriculture in the lives of all Nebraskans. To learn more or access an electronic version of this publication, visit us at **www.nefbfoundation.org** or contact the Nebraska Farm Bureau Foundation.

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NEBRASKA AGRICULTURE IN THE CLASSROOM
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Special thanks to these organizations for their continuous support: **Nebraska Corn Board, Nebraska Beef Council, We Support Ag, Nebraska Soybean Checkoff, and Farm Credit Services of America.**