

Agricultural Conservation

Conservation means protecting Earth's natural resources for current and future generations. Stewardship means taking care of something. North Dakota farmers and ranchers conserve soil, water and air. They're stewards of their land and livestock.

Check which of these you think farmers and ranchers do to conserve resources and be good stewards.

- Provide dairy cows with comfortable bedding of sand, rubber, foam, sawdust or clean straw.
- Plant trees in windbreaks to reduce soil erosion.
- Provide nutritious feed for chickens and pigs.
- Use no-till or minimum tillage practices in fields to leave residue on the soil surface.
- Get veterinary care for a calf when it's not feeling well.
- Turn off irrigation when it's raining.
- Ensure cattle have plenty of clean water.
- Plant grass waterways rather than crops where water naturally flows.
- Don't use heavy equipment in wet fields to avoid soil compaction and ruts.

Farmers try to conserve water on their farms just like you do in your home. **List three ways you conserve water at home.**

GRASS WATERWAYS

IRRIGATING POTATO PLANTS

Each American uses about 80 gallons of water a day.



Water Erosion

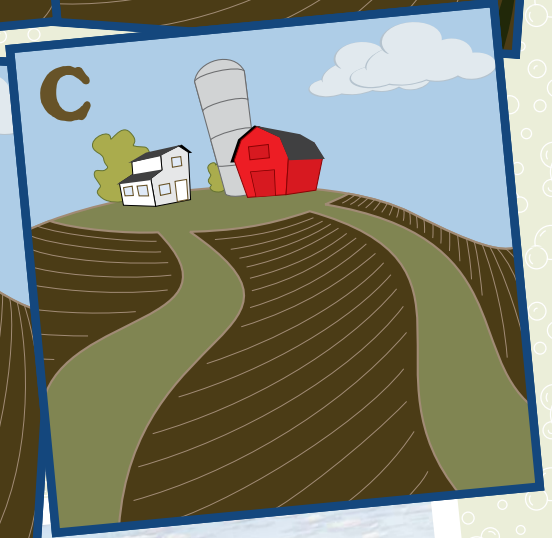
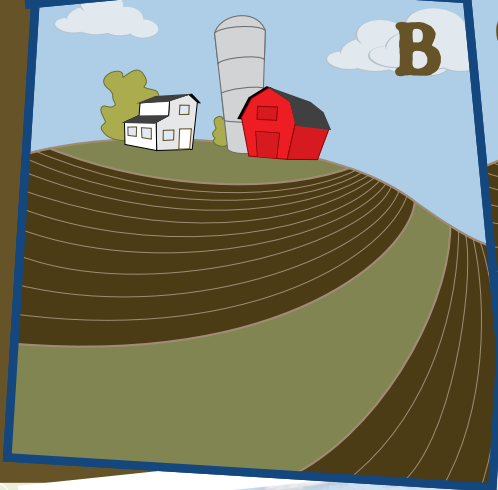
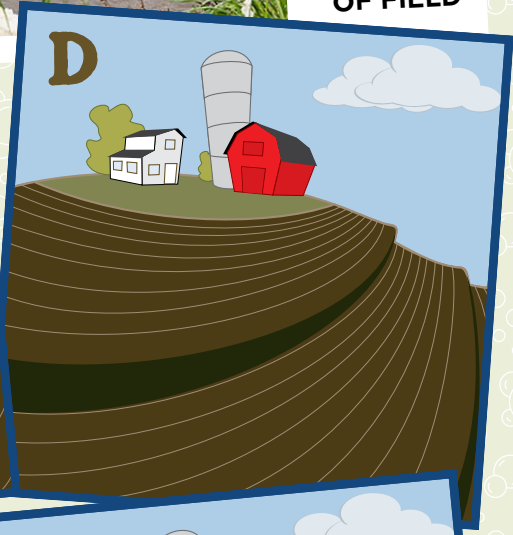
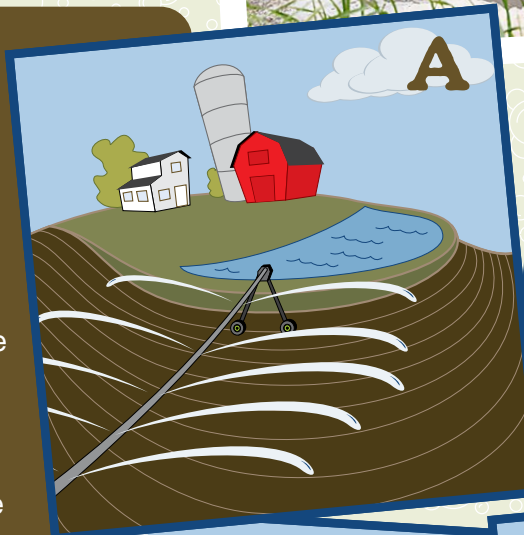
Erosion is the process of breaking things down. In agriculture, chunks of soil are moved by water or wind and broken into finer soil that washes or blows easily. The erosion rate by water on U.S. croplands has been reduced by 24% in the last 15 years.



**FLOODING
CAUSING
EROSION
OF FIELD**

Match the graphic to the term that describes each soil conservation technique.

- Contour farming** – planting crops across slopes to follow the contours of a field to break up the flow of water.
- Terraces** – a series of steplike contours in fields. Each “step” slows the flow of water runoff, slowing the erosion process.
- Dam** – an earthen or concrete structure to stop water flow to trap sediment, stabilize drainage ways and reduce erosion, store excess water temporarily to reduce flood damage, or store water for livestock, irrigation, household or municipal use.
- Grassed waterway** – seeded grass in areas of a farm field prone to heavy water erosion or gullying.



SOIL ERODED FROM FIELD

Plants Need Soil

Plants absorb nutrients from the soil with their roots. Their roots also drain water from the soil, which keeps the soil from staying too wet. Roots help make soil, too. They split rocks into pieces that later become soil.

Soil Layers

Use these definitions to label the soil layers.

B Horizon – Also called the subsoil, it contains clay and mineral deposits (like iron, aluminum oxides and calcium carbonate) that it receives from layers above it when water drips from the soil above.

R Horizon – The unweathered rock (bedrock) layer that is beneath all the other layers.

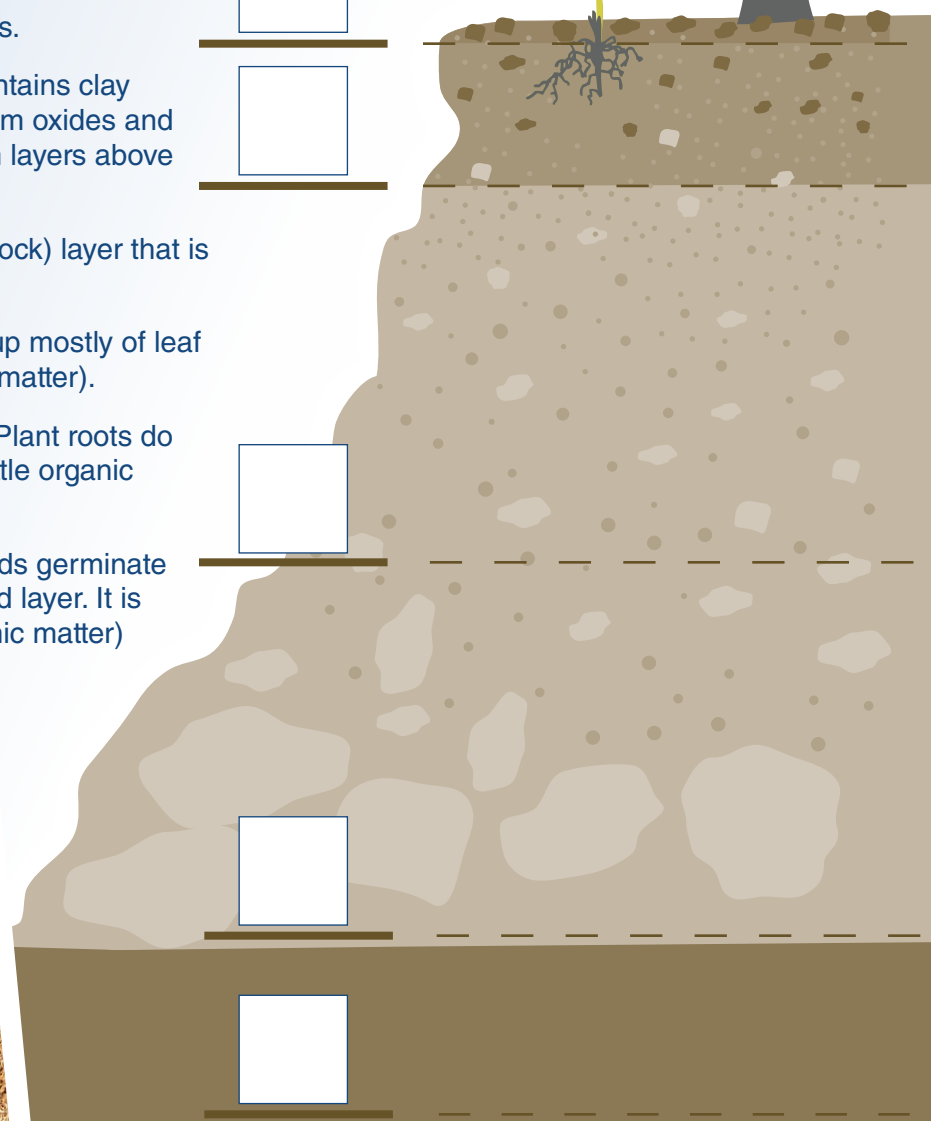
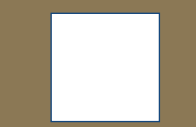
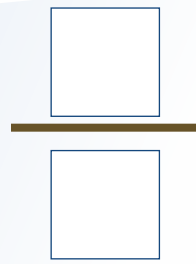
O Horizon – Organic layer of soil, made up mostly of leaf litter and humus (decomposed organic matter).

C Horizon – Slightly broken-up bedrock. Plant roots do not penetrate into this layer, and very little organic material is found in this layer.

A Horizon – The layer called topsoil. Seeds germinate and plant roots grow in this dark-colored layer. It is made up of humus (decomposed organic matter) mixed with mineral particles.



SOIL LAYERS EXPOSED BY RIVER EROSION



SOIL LAYERS



Ways to Reduce Wind Erosion

Erosion is the process of breaking things down. In agriculture, chunks of soil are moved by water or wind and broken into finer soil that washes or blows easily.

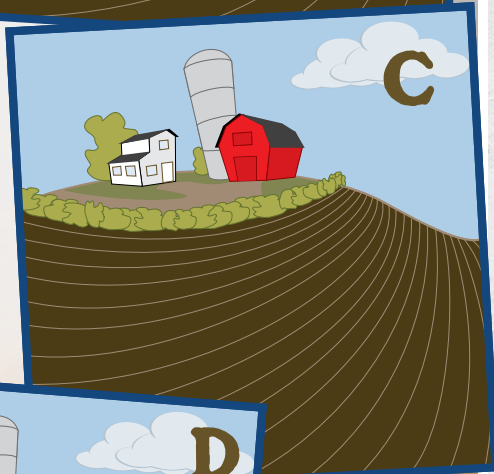
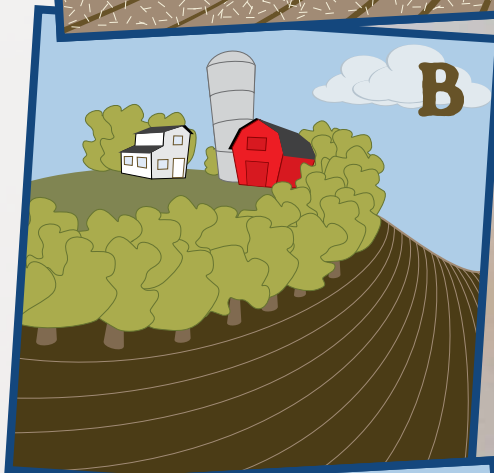
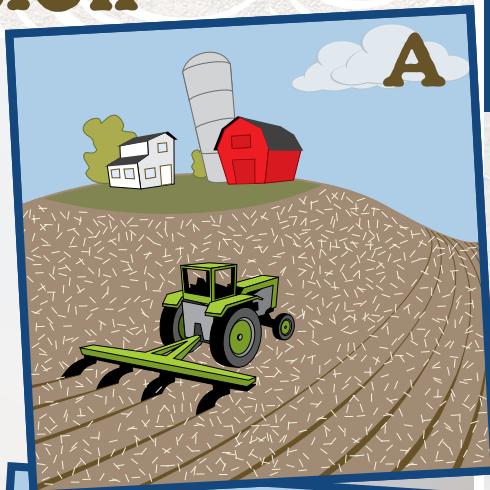
Match the graphic to the term that describes a conservation technique to reduce wind erosion.

_____ **Vegetative wind barriers** – strips of perennial or annual grass planted to hold soil in the ground.

_____ **Living snow fence** – a line of short trees, shrubs, crops and/or native grasses often along roads or around homesteads that trap snow as it blows across fields, piling it up before it reaches the roads and buildings.

_____ **Reduced-tillage farming** – any farming method that keeps tillage operations to a minimum and leaves at least 30 percent of the soil surface covered with plant residue after planting to reduce soil erosion by water or wind.

_____ **Windbreak or shelterbelt** – rows of trees that protect a farmer’s homestead or reduces wind erosion in farm fields.



The 1930s: Dust and Depression

Drought during the 1930s resulted in dry soil, crop failures and devastating dust storms throughout the Midwest. The soil on many farms was destroyed for crop production and grass couldn't grow for grazing cattle, so many farm and ranch families moved away.

After the Dust Bowl, farmers and ranchers received financial aid from the federal government and information on how to adopt soil conservation practices.

A period of time when the economy is very poor is called a depression. The United States' 1930s depression was so severe it is referred to as the "Great Depression."

The drought and low crop prices of the 1930s caused a farm depression and hardship across North Dakota. Farm foreclosures (where the farmer can't pay the money back that was borrowed from the bank and the bank must sell the farm) forced many farm families to move to cities or leave North Dakota.

1. North Dakota's average precipitation (which includes rain, snow and sleet) was a low of 8.8 inches in 1936 and a high of 24.4 inches in 2019. How many more inches of precipitation was the statewide average in 2019 compared to 1936?



SOIL DRIFTING AT EDGE OF ROAD



SOIL DRIFTING AT EDGE OF FIELD

NDSU Archives

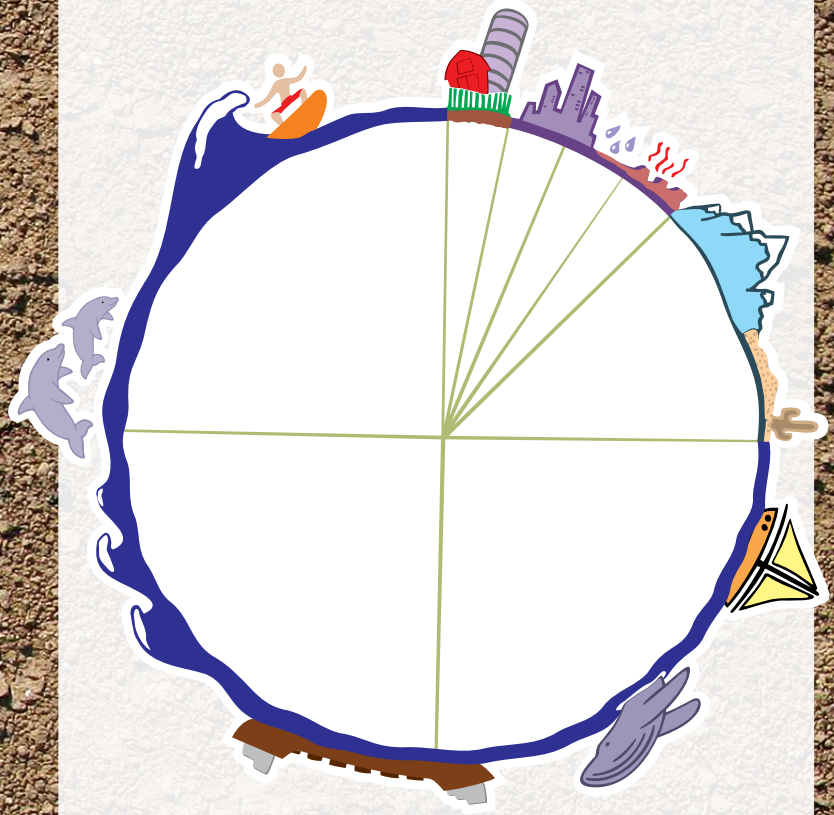
A Slice of Soil

Imagine the Earth as a pie. Cut the pie into four equal parts. Three parts represent the oceans of the world. Color 3/4 of the pie chart blue to represent the oceans. The fourth part represents the land area.

Cut the land section in half to make two 1/8 pieces. One section represents land such as desert, swamp, Antarctic, Arctic and mountain regions. These regions are not suitable for people to live. Color this 1/8 red.

Cut the remaining 1/8 section into four equal parts. Three of these 1/32 sections represent the areas of the world that are too rocky, too wet, too hot or too poor for production, as well as areas developed by people. Color this 3/32 orange.

Color the last 1/32 section brown. This small bit represents the soil of our Earth that the world's more than 8 billion people depend on for food production. That's why it's so important for farmers to be good stewards of soil.



2. The highest temperature ever recorded in North Dakota was 121F in Steele on July 6, 1936. The coldest temperature occurred the same year: -60F in Parshall on February 15, 1936. How many degrees Fahrenheit was the difference between those two temperatures in 1936?

3. A bushel is about the size of a laundry basket. In 1932, North Dakota farmers sold wheat for 36 cents per bushel. Today, a farmer might sell wheat for \$7.70 per bushel. How much more is that per bushel?

4. If a farmer today sells 800 bushels of wheat, how much more would they make compared to their great grandparents in 1932?

5. North Dakota's population was 680,000 people in 1930. About 121,000 people moved out of the state during the 1930s. What was the state's population in 1940?

6. In 2021, North Dakota's population was 775,000 people. How many more people lived in the state in 2021 compared to 1930?

7. In 1933, North Dakota had 86,000 farms. In 1940, there were 73,692 farms in the state. How many North Dakota farms were lost due to the Great Depression and drought from 1933 to 1940?

Soil and Water Math

1. A farmer is irrigating crops, but 45 gallons of water are leaking from the pipe each day. How many gallons are being lost each week?
2. In North Dakota, about $\frac{2}{3}$ of soil erosion is caused by wind, and the rest is caused by water. What fraction is caused by water?
3. Nature requires about 500 years to build 1 inch of topsoil. How many years are needed to develop $\frac{1}{2}$ inch of topsoil?

Farmers and Ranchers are Conservationists

Circle the best answer to fit the sentence.

1. To avoid overgrazing, farmers and ranchers practice wise land and (heard or herd) management.
2. To improve (their or there) knowledge and practice, farmers work closely with soil conservationists.
3. Farmers must (now or know) how to rotate crops for best results.
4. Ranchers (choose or chose) to work closely with veterinarians to ensure that their livestock remain healthy.
5. Farmers learn to manage (obnoxious or noxious) weeds to have greater crop yields.
6. A ewe can recognize the “baa” of (it’s or its) own lamb.
7. Farmers and ranchers care for their livestock because it’s the right thing to do (ethically or ethnically).
8. Caring for their livestock also makes good business (cents or sense).
9. (Conversation or Conservation) means taking care of something to prevent loss.
10. (Precipitation or Percipitation) includes all moisture falling from the sky as rain, snow and sleet.
11. Soil consists of various sized (particals or particles).
12. Soil must contain at least 12% (oxygen or oxigen) for roots to grow.
13. A (droust or drought) is a prolonged period of abnormally low rainfall, leading to a shortage of water.



Career Corner

Dustin Krueger

Watershed Coordinator

Stutsman County Soil Conservation District, Jamestown

Use these words to fill in the blanks: rotation, management, productivity, nitrogen, watershed, contaminants, pollution, analyze



Dustin Krueger teaches farmers, ranchers, other landowners, students and the public how to conserve natural resources.

“As a watershed coordinator, I encourage landowners and producers to implement farm, ranch and forestland conservation practices to protect soil 1. _____, water quality and quantity, air quality and wildlife habitat,” Dustin said. “A 2. _____ is an area that drains to a common point: for example, everything that drains into Jamestown Reservoir. So, everybody lives in a watershed.”

Dustin said water erosion carries many nutrients and 3. _____ through local water systems.

“We are trying to capture water on the landscape and limit runoff to the water bodies in the watershed. No-till, cover crops, rotational grazing, crop 4. _____, nutrient management, water tanks and fencing are some of the best management practices we encourage producers to try.”

For example, Dustin shows farmers techniques to keep 5. _____, a plant nutrient, in the soil rather than letting it run into creeks. This improves the soil’s nutrition for the plants and reduces damage to aquatic plants and animals.

“I get to be outside quite a bit during the spring, summer and fall to do water sampling,” Dustin said. “Sampling a lake involves driving a boat out to the sampling site and collecting the water sample since we don’t just want samples from the shore that may not represent the entire lake. We also water sample creeks and streams.

“We send those samples to the health department to 6. _____ for trace metals, nutrients, total solubles, nitrogen, phosphorus and other potential 7. _____. If any are too high, we try to work with the landowners to encourage implementing practices that will improve their water quality.” Solubles are substances that can dissolve in water. Phosphorus is a chemical that can be poisonous in high quantities.

During the winter, Dustin carries out many educational activities - with landowners individually and at meetings and with students in classrooms and at EcoEd Days, Living Ag Classrooms and other events.

To prepare for his career, Dustin studied fisheries and wildlife 8. _____ at Valley City State University. He worked for ND Game and Fish, then joined the Soil Conservation District as the tree technician, primarily planting trees. He especially enjoys his current job since it’s natural-resource related and he gets to be outdoors about four days of the week during the summer.

Take this Ag Mag home to share what you've learned about agricultural conservation.



Thank you for providing information for this North Dakota Ag Mag:

- North Dakota State University
- Natural Resources Conservation Service/Emmons County
- USDA Natural Resources Conservation Service
- N.D. Career and Technical Education/Agricultural Education
- Project Learning Tree
- N.D. Project Food, Land and People
- Utah Newspapers in Education/Utah Agriculture in the Classroom
- Enchanted Learning
- Conservation Technology Information Center
- U.S. Geological Survey
- North Dakota Farm Bureau
- Ag in the Classroom, Illinois Farm Bureau
- Council for Biotechnology Information
- South Dakota State University
- National 4-H Council
- State Historical Society of North Dakota



Agriculture Commissioner
Doug Goehring

The North Dakota Ag Mag is a project of the North Dakota Agriculture in the Classroom Council, which is organized through the North Dakota Department of Agriculture.

Ag in the Classroom Council:

Ag in the Classroom Specialist
ND Department of Agriculture
600 E. Boulevard Ave., Dept. 602
Bismarck, ND 58505-0020
701-328-2231 or 800-242-7535
ndda@nd.gov
www.ndda.nd.gov/aitc

NDSU | EXTENSION

www.facebook.com/ndaginclassroom
Ag Mag Production by North Dakota State University Agriculture Communication:
Tennille Altepeter, Teacher Reviewer;
Becky Koch, Editor; David Haasser, Graphic Designer

Unlabeled photos are from istockphoto.com

Thank you to our sponsors!

