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4-H 287 Water Riches : Water : How we use it

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Water essential to all life

The current dry spell makes people understand how important water is, city water manager Kim Krum said yesterday. "A drought is a time when people want to use more water than is available," Krum said. "It's when the amount of rainfall is less than the amount of water we want to have," she said.

A person needs to drink six to eight glasses of water each day to stay healthy, she said. Without water, a human can only live a few days. There can be enough water if everyone works together, Curly Drip said his parents are cutting the family's water use during this dry weather.

"A drought is a time when people want to use more water than is available," Krum said. "They stopped watering their lawn and Dad said we can't play in the sprinkler during this drought," Curly said.

There can be enough water if everyone works together, Curly said, "but we must not use more water than we really need."

4th graders learn to use less water

Before reading this article, think about the headline. What do you think the article is about? Write down how many times you think you use water each day. Guess about how many gallons that is. (HINT: If you leave the water running while brushing your teeth, you use at least one gallon. A shower may take 30 gallons if you take a long one or 15 gallons if your songs are short.) Number of times I use water each day: ___. How many gallons is that? ___

The current drought has given local elementary students something to think about, said YMCA director Tom Tuttle.

In the summer program, "Not a Drop to Spare," children pay attention to the water they use and think of ways to use less water, Tuttle said.

"In our country," he said, "each American uses between 60 and 100 gallons of water each day. And right now, many cities don't have 100 gallons for every person to use."

"Agriculture and factories use much more water than individuals do," Tuttle said. Dry spells like this can really be a problem for them. Fourth-graders at Park Elementary School found that they can use only 40 gallons a day now that water is in short supply. The graph on this page shows how much water the average American uses.

Now think about this... The average American uses at least 60 gallons of water each day, but these fourth-graders used only 40. Why do they use less than the national average?

Study the illustration. What ways do you use water that would fit into the area listed as "other"?

How most Americans use water every day.

- Cooking 2%
- Drinking 2%
- Other 2%
- Cleaning 11%
- Laundry 20%
- Bathtub and Showers 20%
- Toilet 25%
- Yard 35%

Water not just for people

Sometimes humans think they are the only things that need fresh water, but they are not, world conservationist Vanna Slovski said earlier today. Many plants and animals need fresh water just as much as people do, Slovski said, but they do not always need the same amount.

Mosquitoes, frogs, mosquitoes and alligators are a few living things that need lots of water, she said.

'Protect the water'

The governor told citizens today that "we must never take our water supply for granted."

Governor Cleebor said that the current drought has made two problems for the state:

1) How do we supply enough water for all our needs? (quantity)
2) How do we keep our water safe? (quality)

"Once good water is polluted or gone," Gov. Cleebor said, "it takes many, many years to replace it or make it safe again.

The state is working with farmers, factories, and residents to help solve the two problems before some towns and farms have only dirty (polluted) water to use, he said.
**EDITORIALS**

**From the Editor:**

I'll bet every citizen of this state is ready for a steady, three-day rain. I know I am. This paper wants to thank all of you for doing a wonderful job of saving our water supplies. It is never easy to reduce the amount of water we use each day, but during a drought we have to cooperate. Let's keep up the good work, and hope for RAIN!

**Letters from Our Readers**

Gibbon, Neb.

The drought makes us think about the quantity of water and whether we may run out. In Gibbon, Nebraska, we are also thinking about the quality of our water and whether it is safe to drink. In 1982, we found out we had a very serious problem. Our city's water supply was polluted. Because of this, we had to drill new wells to find safe water. It cost a lot of money and was really scary when we found out about our pollution problem. Preventing the problem would have been a lot better than trying to figure out what to do once the problem existed.

We should have been more careful.

Learned Too Late

Dear Aqua,

I have a real problem with my parents. They are always telling me to stop wasting water. It really makes me mad when they tell me to shut the water off while I am brushing my teeth. I like the water running—it sounds good and looks pretty. They never let me take a nice long shower. And lots of times I can't even wear my favorite clothes because my mom won't run the washer until she has a full load!

Is there any way I can make my parents understand that there is plenty of water for everyone? I want them to stop nagging me.

Wanting Water

Dear Wanting,

You should thank your parents. They know how valuable water really is to all of us. We shouldn't use more water than we need. The world is using more and more water every day. There are about 5 billion people now living on Earth and all need water. Do the plants and animals need water for irrigation so they can raise food for all the people? The factories that make pop, TV sets, cassette tapes, basketballs, bicycles, and other things also use lots of water.

We all like long showers, but we also like a lot of other things. We have to limit the water we use so there will be enough for other things.

It's up to every one of us to help.

Aqua

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**Meet the cartoonist**

Matthew Geller, the cartoonist for Water Riches, is an eighth grader at Waverly (Nebraska) Junior High. He is the son of Susan Geller of rural Greenwood and Rick Geller of Omaha.

He especially enjoys drawing caricatures and cartoons and hopes to become a professional animator someday. Matt has won several local poster contests, has designed stage sets, and has drawn editorial cartoons for the high school newspaper. In June 1988 Matt received an award for the Outstanding Nebraska Entry in the National History Day contest.

In addition to drawing, Matt enjoys collecting baseball cards, playing oboe in the school band, participating in sports, doing impersonations and reading mystery books.

Look for Matt in the opening video of Unit 2 as he plays Dr. Ozzie Noz, director of hydrologic studies at State University.

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**Notes for the reporter**

Pretend you are a reporter during this drought. What questions about water would you like to ask the city water manager? What questions about water would you like to ask an American scientist?

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**Let's talk about it**

Can all plants and animals live in salty water?

Where do animals and aquatic plants (plants that live in water) get their water?

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**A bubble for thought**

Is the water you are drinking safe?

Yes No __

If you are not sure, how can you find out?

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**WATER RICHES**

Water Riches is part of a multi-media program presented by the University of Nebraska Cooperative Extension Service 4-H program. Video tapes, a teacher's guide, and a computer game also are available.

Water Riches was written by Shirley Trout, a farm wife and free lance writer from Waverly, Neb., under the supervision of Donald D. Siffring, University of Nebraska Extension Specialist, 4-H Youth Development.

Technical consultants were: Delynn Hay, University of Nebraska Extension Specialist, Water Resources and Irrigation, and Deon Axthelm, Professor Emeritus, University of Nebraska Extension Specialist, Water Resources.

The editorial cartoon and comic strip are by Matthew Geller.

Artwork is by Renee Lanik.

The mission of 4-H is to assist youth and volunteer staff through informal education that helps them acquire knowledge, develop life skills, and strengthen values that enable them to become increasingly self-directing, productive and contributing citizens.
Pord's Maze

Pord really has had a busy day. It seems like everything he did made him thirsty!

Follow the maze through Pord's day.

Numbers Count

Let's say that people need eight glasses of water each day. Each glass holds about 8 ounces. How many ounces of water are needed each day for a person to stay healthy?

Did you know?

A family of four needs about 150,000 gallons of water a year. That would cover a football field 4 1/2 inches deep, and that’s deep enough to cover your ankles.

Word for the day

hydrology: The study of water as it relates to the earth

Professor Owl

Today, we will be naming the five important uses of water. Why don’t you share, Freddie.

Well, Professor Owl, there's drinking, cleaning, use for use, and recreation.

We use it for cooking, and can... oh! I can’t remember.

That's okay.

It’s agriculture of course. This takes up most of our water. For food and other things too.

Water supply stays about the same

Water is a "natural resource" because it is a natural part of the earth. Water is not made by man. The amount of water Earth has to use is always about the same, reported university scientist Herbert Sneed. That may be hard to believe during a drought, he admitted.

"Three-fourths of the earth's surface is water," Sneed said. About 97 percent of Earth's water is in the oceans — that's almost all the water on Earth! The water in the oceans, in some lakes, and under the ground in some places has salt in it. Salt water cannot be used for many things. Animals cannot drink salt water. Most plants will die if given salt water.

Water that you can drink is called "fresh" water. It is also used for irrigating crops and gardens and making products in factories. "Only 3 percent of the earth's water is not seawater," Sneed said. "It's been that way since the beginning of time."

Health tip

People need six to eight glasses of water each day when they are doing normal activities. When you are active, you need more. Don't ask your body to do things for you if you won't give it the "fuel" it needs to stay healthy. Drink extra water when you exercise!
Now, let's look at Joe American. Yesterday, Joe only did one small load of clothes (40 gallons). He flushed the stool five times (5 x 5 gallons). Joe likes long, hot showers (30 gallons). His dripping faucet is on his "to-do" list. He'll get to it eventually, but it isn't very bad yet, he says (25 gallons). It was hot again today, and Joe didn't pay attention to the city's ban on watering. He gave his lawn a 1" drink (4000 gallons)!

How many gallons of water did Joe use yesterday? __________

How could he use less water? ________________________

It was hot again today, and Joe didn't pay attention to the city's ban on watering. He gave his lawn a 1" drink (4000 gallons)!

A dripping faucet can waste 15-100 gallons of water a day, depending on how bad the leak.

A toilet uses 4 to 7 gallons each time it is flushed.

An average American uses between ______ and _______ gallons of water each day.

It takes 4,000-6,000 gallons of water to put 1 inch of water on the average lawn!

It takes 40-60 gallons of water to wash each load of clothes or dishes.

How well did I read?

You have read the news in this paper. Now it's time to think about it. Complete the following questions.

For questions 1-5, use these words to help you fill in the blanks: hydrology, quality, responsibility, percolation, quantity, natural resource, evaporation.

1. Water is a natural part of the earth. Water is not made by man. It is known as _______.

2. Seawater can be used to irrigate crops on land. ______ True ______ False

3. Taking care of Earth's water is something everyone should do. It is our ______.

4. The study of water as it relates to earth is called ________.

5. People have two major concerns about Earth's water. They are: water _______ and water _______.

6. An average American uses between ______ and _______ gallons of water each day.

7. How many gallons of water might you use if you like long shower songs?

8. What other words do you know that have the word "hydro" in them?

9. What other words do you know that have the word "cycle" in them?

Look one up in the dictionary and write the word and the definition here.

Presto!

First you see it, then you don't

Water is used to dissolve and dilute many things. That is, water spreads out particles in the water.

Think what it would be like if you had to clean your paint brush without water during art class. Or what if you sprayed something into your eye and you had no water to help wash it out?

To see how dissolving and dilution work, pour a teaspoon of sugar into a clear glass of water. Stir it. Where does the sugar go?

Taste the water. The sugar is still there, but it is now dissolved in the water.

Now pour five drops of blue food coloring into a glass of water and stir. You saw the dark blue drops go into the glass, but the water looks light blue. The dark blue coloring has been diluted so the blue particles are spread throughout the whole glass.

How Do You Know It's Not?

On a separate sheet of paper, write a story about a planet (you can make up the name). Tell us how life there uses water differently than we use it on Earth. Who knows? Maybe it really is that way!

If you are a better artist than a writer, draw a picture of an alien. Everyone needs a name and a home, so name your creature and the planet it's from. Be able to tell the class what your creature does with water that is different than what you do on Earth.

Do a good job now. You may meet this guy some time in your travels!
Earth’s water – hydrologic cycle explained

"Water is always moving," explained Orzio Noz, director of hydrologic studies at State University, as he spoke to a group of gardeners recently. Noz said the hydrologic cycle is the never-ending movement of water on Earth and in the atmosphere around Earth.

When precipitation hits the ground, it either infiltrates into the soil or runs off on top of the ground. Water runoff flows downhill into streams, rivers, lakes and oceans, also called surface water. The water that infiltrates into the soil and reaches an aquifer is called ground water.

The amount of water that soaks into the ground depends on how well the water can enter the soil. This is called infiltration. How fast the water moves in the soil is called percolation.

For example, rocks and clay have very slow infiltration and percolation rates. Water cannot move through them easily.

Sand has fast infiltration and percolation rates. Water passes through sand easily.

Nebraska settled by rainfall

Early pioneers usually settled where there was plenty of rainfall and river water to meet their needs, according to state historian Brenda Mull.

Southeastern Nebraska gets about 35 inches of rain annually while western Nebraska gets only about 15 inches each year. Eastern Nebraska was settled sooner and with more people because it had more water available, Mull said.

Most settlers lived near the Missouri River, the Platte River or other rivers and streams. The rivers and streams provided water for drinking, washing and irrigating, she said.

Trees also need the water from rivers and streams, Mull said. Settlers needed trees for lumber to build their homes.

Settlers found fewer rivers, streams and trees as they traveled west, Mull said. The small amount of rain that fell each year could only raise grass.

Settlers called central and western Nebraska the “Great American Desert,” she said.

Hydrologic cycle

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For example, rocks and clay have very slow infiltration and percolation rates. Water cannot move through them easily.

Sand has fast infiltration and percolation rates. Water passes through sand easily.

Numbers count

State historian Brenda Mull said southeastern Nebraska gets about 35 inches of rainfall each year. The western part of the Nebraska Panhandle gets only about 15 inches.

How much more rainfall does southeastern Nebraska get than western Nebraska?
From the Editor:
It seems amazing to me that we still can’t create water. We claim to be such experts on so many things. Why can’t our scientists create water?
Water is made of two parts hydrogen and one part oxygen. It just doesn’t seem like it would be too hard to make more since so many places need more water.
Isn’t it strange? There must be some explanation.

Letter to the Editor:

Valentine, Neb.
I just got back from a very exciting trip to Arizona. While I was there, I learned a lot about how important water is to us.
My mother and I were driving across the desert searching for rocks. We weren’t on any main roads, so the ride was very rough and slow.
Our four-wheel-drive vehicle broke down one evening about 8. We were miles from any town.
I was really scared that we were going to die because we had no water, but my mother showed me how to “make” water by using a sheet of plastic, a cup, and a stone.
I was amazed when I woke up in the morning and had enough water to wet my mouth.

Dear Aqua,
I have a problem. My mother loves house plants, but she puts them in my bedroom. There must be 40 plants in my room! They are really pretty, but I can hardly move around. I don’t know if the plants have anything to do with it, but my bedroom windows are always fogged over now. I can never see out first thing in the morning. I love my mother and I like her plants, but I want my room and my windows back.

Cynthia Brach

Dear Wilted,
Your mother must have quite a green thumb! Your windows are foggy because there are so many plants in your room. The plants give off moisture as they grow and as a way to stay cool. This is called “transpiration.”
Ask your mother if you could spread the plants around the whole house instead of keeping them all in your bedroom. They will probably grow in other rooms and you will be able to see outside again.

Aqua

Drought breaks as rains begin

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Farmer steams as hail falls

Local farmer I.C. Cube said he couldn’t believe his eyes last night. The long dry spell ended with his corn fields being stripped by hail.
Earth’s water comes in three forms,” Cube said, “gas, liquid, and solid. I don’t understand why it had to come in the solid form this time.”
Cube was talking about the hail that shredded his corn plants. Hail is water that freezes in the clouds and then falls as ice chunks.
Sometimes hail stays as small as the shot from a BB gun. Other times it gets as large as a softball.
The hail that hurt farmer Cube’s corn was about as big as golf balls.

I.C. Cube
(as portrayed by Wesley Trout)
Water: The unending cycle

Complete the following puzzle by filling in the blanks using the clues below. The answer will go in the same line as the clue number. Circle the one very important word that appears downward.

1. E ____________
2. V ____________
3. I ____________
4. P ____________
5. G ____________ W ______
6. S ____________ W ______
7. C ____________
8. I ____________
9. H ____________ C ______
10. S _____

1. When surface water ____________, it adds vapor to the atmosphere.
2. Water in the form of a gas is called ____________.
3. When water enters the spaces in soil, sand and rocks, the process is called ____________.
4. Rain, snow, sleet, or hail are examples of ____________.
5. Water stored under the earth's surface is called ____________.
6. Rivers, lakes, streams and oceans are examples of ____________.
7. When vapor is changed into droplets, the process is called ____________.
8. When a farmer waters his field, it is called ____________.
9. During the ____________, water changes from vapor to liquid and back to vapor again.
10. One form of precipitation. (HINT: Some people ski on it in the winter.) ____________

Word for the day

transpiration: the process by which plants give off water vapor to the atmosphere.

Think about it

If a cycle is something that happens over and over again, and hydrologic is the word scientists use when they talk about water as it relates to earth, then what is the hydrologic cycle?

Say that again?

In explaining the hydrologic cycle, you have learned many new words. You may have heard some of them used before with slightly different meanings. See if you can place the words below in the sentences where they belong.

WORDS:
condensed
percolate
surface
evaporated

You have to ____________ the coffee before you drink it.
The milk in the second container is regular milk which has had the water ____________ out of it.
This sandpaper has a very rough ____________.
These two books are the same story, but the book on the left uses fewer words to tell the story than the book on the right. The smaller book is ____________

Professor Owl

Professor Owl, I don't understand the hydrologic cycle!

Well, Bojo, the hydrologic cycle is simple. It's the route water travels through nature.

This is from Earth to the atmosphere and back to Earth.

So there's no new water created?

Exactly right!
How well did I read?

Label the parts of the hydrologic cycle with the following words. (Use the clues if you need help.)

transpiration  evaporation  ground water
percolation  infiltration  precipitation
surface water  condensation  runoff

1. Water falls to earth as rain, snow, sleet, or hail.
2. Some of the water on the ground flows into streams, rivers, and lakes.
3. This is about 3/4 of the earth's surface.
4. Some water soaks into the ground.
5. Plants use water to grow and stay cool. Then they let it go back into the atmosphere.
6. Water movement through soil and other materials below the soil surface.
7. What we call the water stored under the surface of the earth.
8. Water in oceans, lakes, rivers and other areas on the ground is heated by the sun. The heated water turns to invisible gas called "vapor." The vapor then rises into the sky.
9. As water vapor rises, it cools. When it gets cold enough, droplets form and make clouds.

Let's review

Answer the following questions. All of the answers can be found in this issue of Water Riches.

1. List three examples of surface water.

2. List three forms of precipitation.

3. When water leaves surface water as a vapor, that process is called

4. When plants give off water vapor, that process is called

5. When precipitation hits the ground, some of the water runs off and some soaks into the soil. What word is used to describe the action of the water soaking into the soil?

Circle the ones that are frozen when they reach the ground.
Weather capsule
Sunny and mild.
Highs near 70.

Water: Above and below the ground

 Layers under the soil

Water cannot move any lower than the layer of bedrock. Notice that the bottom of the well sits in the sand and gravel aquifer.

The sand and gravel aquifer allows water to move easily toward the well as the pump removes the water.

City needs new water well

The city needs a new well, City Water Engineer Digger Mudd said yesterday.

He told the city council that a new well should be drilled because the old one is not pumping enough water.

Water is stored in two ways, Mudd said. Some is stored as surface water, such as in lakes, streams, rivers, and ponds, and some is stored as ground water.

Mudd said that ground water is water that soaks (infiltrates) into the earth. It is stored in layers of rock, soil, gravel and sand below the surface.

The layers that store the water are often above a layer of bedrock. Water cannot pass through bedrock.

Ground water is stored in

How water levels change

Ground water can affect surface water. The surface water supply increases with precipitation. It also increases when the water table gets higher than the ground. As the water table drops, the level of the surface water also will drop.

Draw a line on the illustration of ground layers to show a lower water table. What areas will still have surface water now?

How ground water is used in Nebraska

The numbers above show how Nebraskans use their ground water. It's easy to see that most ground water is used for irrigation.

In Nebraska, 82 percent of the people use ground water rather than surface water in their homes. If 100 percent is everybody in Nebraska, what percentage of people use surface water?

Which is used more, ground water or surface water?

A bubble for thought

On the surface, water always travels downhill because of gravity. Does gravity move ground water downhill, too?

Just imagine...

If you could be a drop of water, what would it look like to be in an aquifer? How would you get there? How would you get out?
From the Editor:

I am glad to hear that Digger Mudd is pushing for a new well for our city. I knew something was going wrong with our water use, even during periods of normal precipitation.

I hope the City Council will listen to Mr. Mudd and vote to improve our city's wells. I like good, fresh water. And my lawn would appreciate a good drink (which it hasn't been able to get lately because of the ban on watering).

Keep up the good work, Mr. Mudd!

Letter to the Editor: Valentine, Neb.

I live in the Sandhills of Nebraska, and my dad has shown me where I can find water easily. In those spots, the water table is close to the surface. We don't have to dig very deep before we find moist sand. The holes we dig in these areas will fill with water! I've learned a lot about water in the Sandhills. There is a large amount of water stored underground. In the valley areas, the water table is above the surface. This makes wetland areas for ducks and other wildlife.

My dad said the Sandhills are different than many areas. I think we're lucky in the Sandhills.

Dear Aqua,

The front yard of my school is really ugly. My teacher said that our town sits on a large layer of clay and that we don't have very much water to keep grass and trees alive.

How can one part of the country have plenty of water and other parts not have enough?

Dear Angry,

Don't be too mad. There's really nothing you can do about what is under the surface of the ground.

Angry

We have less rainfall here than in Illinois. Also, the clay that is under your area does not make a good aquifer. The water cannot move fast enough through the clay for good wells.

If sand or gravel were under you, the amount of water you could use might not be a problem. However, if you had sand or gravel, then you would have to worry more about not polluting the water.

Everybody has something to think about when it comes to our ground water supply. Your school is very wise. It is using your water supply wisely.

Aqua

Aquifers smaller and may be less safe

Experts are worried about the shrinking ground water supplies under Nebraska and other states, according to Sandy Seep, state hydrologist. Several Central Plains states sit over the largest aquifer in North America. It is called the Ogallala aquifer, Seep said.

The Ogallala holds water under parts of Nebraska, South Dakota, Wyoming, Colorado, Kansas, Oklahoma, New Mexico and Texas. The Ogallala aquifer and other aquifers do not have as much water today as they did 50 years ago, he said. People are using the ground water faster than nature can replace it.

Some people are more worried about the quality of ground water than about how much there is. Both problems are very important, he said.

"Scientists, farmers, government officials and others are very worried about our ground water supplies," Seep said.

Water experts are teaching people to save water and keep it safe. "Everyone must understand the importance of ground water," he said, "or we will not have enough safe water for our grandchildren and their children."

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Ground water regions in Nebraska*

North America’s largest underground water supply, the Ogallala aquifer, stores millions of gallons of water under the plains states.

The Ogallala aquifer lies under most of Nebraska. Some areas have other, smaller aquifers under them. But not all areas of the state have the same amount of water. The amount of water stored underground depends on what types of rocks and soils lie below the surface.

This map outlines the areas that lie under Nebraska.

**Region 1 — Sand Hills:** Large amounts of high-quality water can be obtained. The Ogallala aquifer is under this entire region. There is little runoff because rain soaks easily into the sandy soils.

**Region 2 — Platte River Valley:** Large quantities of high-quality water can be obtained from the sands and gravels under most of this region. The ground water in the western part of the region contains large amounts of dissolved minerals. In some of the Platte River valley, fertilizer applications are polluting ground water.

**Region 3 — Missouri River Lowlands:** Wells in this region can provide large amounts of water. Ground water here contains more dissolved minerals than that in the Platte River Valley, but is still usable.

**Region 4 — South Central Plains:** Large amounts of ground water can be found in most of this region. Water quality problems are developing in some areas. Ground water levels have risen where surface water from the Platte River is used for irrigation.

**Region 5 — Southwestern Tablelands:** Many irrigation wells have been constructed in this region. The water has to be pumped from at least 200 feet deep in most wells. Ground water levels have dropped since irrigation began.

**Regions 6 and 7 — Panhandle Tablelands:** Some areas of this region have large amounts of ground water. The wells are usually several hundred feet deep. Other areas in the region have rock formations that have very little ground water in them.

**Region 8 — East Central Dissected Plains:** The Ogallala aquifer is under the western part of this region. The rest of the region also has a sand and gravel aquifer. Most of the region has enough water to supply irrigation wells. Most of the water is of good quality.

**Region 9 — Republican River Valley and Plains:** Sand and gravel are under the river and creek valleys in this region. The Ogallala aquifer is under some of the northern and western parts of the region. South of the Republican River there is often rock at or just under the soil surface. It is difficult to get very much high-quality water south of the river.

**Regions 10 and 11 — Nebraska Glacial Drift:** This is the region that the ice-age glaciers covered or affected. There are many different aquifer materials under this region. Some are soil and rock in which water moves very slowly. In these areas wells cannot pump much water. It is hard to tell when a well will be good in this region. The ground water is very salty in some parts.

**Region 12 — North Central Tableland:** The sand and gravel aquifer in the Niobrara Valley has small amounts of water. The Ogallala aquifer also has a small amount of water in some of this region. In much of this area, ground water is available only by drilling wells several hundred feet deep.

**Region 13 — Flat Creek-White River Drainage Basin:** Ground water is hard to get here. The aquifer material has very small particles. This causes the water to move very slowly. Small amounts of ground water can be found in the river valleys and other small areas.

**Activity**

Put an X on the map where you live.

Use the map and descriptions of the ground water areas to fill in the blanks.

1. What is the name of the ground water region where you live? ____________

2. The Ogallala and other aquifers lie under this region. Most of the water is of good quality.

3. Ground water levels in this area have dropped since irrigation began.

4. Sands and gravels under most of this region provide large quantities of water, but fertilizer applications are polluting some ground water areas.

5. Because there are rocks that are just under the surface in some areas, it is very hard to get high-quality water — especially on the south side of the Republican River.

6. Ground water is available only by drilling wells several hundred feet deep in much of this area. Small amounts of ground water can be found in the aquifers in the Niobrara River valley.

7. The Ogallala aquifer lies under this entire region. Water easily soaks into the sandy soils.

8. Some areas have large amounts of ground water, but other areas have rock formations with very little ground water in them.

9. These two areas were made by the ice-age glacier and the ground water is often salty.

10. Wells provide large amounts of water. Some areas have dissolved minerals, but the water is still usable.

11. It is not easy to get ground water here because the aquifer material is very small particles. This causes the water to move very slowly.

12. This area has a large supply of water, but water quality problems are developing in some areas. Ground water levels have risen in some areas.

*From the Groundwater Atlas of Nebraska, Resource Atlas #4, University of Nebraska, 1986.
How well did I read?

1. Water is stored for use in our world as _____ and _____.

2. What is the name of North America's largest ground water supply? _____

3. Name the state (or states) NORTH of Nebraska that share(s) the Ogallala aquifer.

4. Name the state (or states) SOUTH of Nebraska that share(s) the Ogallala aquifer.

5. If you live in western Nebraska, you get more / less rainfall each year than people in eastern Nebraska. (Circle the correct answer).

   True or false?
   T F 1. If you could look under ground, the water stored there would look like a lake.
   T F 2. The amount of water in Nebraska's underground water supply is about the same in all areas.

Health tip

Ground water is stored in rock, soil, sand and gravel layers. When water is pumped out of the ground, it sometimes carries dissolved materials and fine particles of soil, sand and gravel with it. However, this does not mean the water is unsafe to drink. The water becomes unsafe (polluted) when the ground contains harmful chemicals. Water must be tested to see if it is safe to drink.

Word for the day

aquifer: a supply of usable ground water stored in the cracks, spaces and pores of underground rock, soil, sand and gravel.

Building a glossary

This is the third unit of Water Riches. With each unit you have learned a new word for the day. Now it's time to start building a glossary of those words. Draw a line from the word on the left to the correct meaning on the right.

acquifer: the study of water as it relates to the earth
hydrology: the process by which plants give off water vapor to the atmosphere
transpiration: A supply of usable ground water stored in the cracks, spaces and pores of underground rock, soil, sand and gravel.

Let's discuss it

Last time, we learned that eastern Nebraska gets more rainfall than western Nebraska. But the illustration of groundwater areas shows that most ground water is in western and central Nebraska. How can that be?

What kinds of underground layers make it easy to pump water out of the ground?

What types of layers hold the water where we live — rock, sand, gravel, clay? Does it (do they) provide a good supply of water?
Weather capsule
Rushes ending in the east
by noon. Dry in the west.
Highs across the state in the
middle 80s.

City questions water quality

City Water Engineer Melvin Mire is leading a fight to move the city landfill.
The landfill, which is 25 years old, is dangerous to the city’s drinking water, Mire said. He wants the city to build a new one that will be safer for the water supply.
The landfill is where people dump their garbage. Sometimes the garbage contains dangerous pollutants. Pollutants are chemicals or wastes that can make water unsafe to drink.
When the landfill was built 25 years ago, he said, people did not know as much about pollution.
"Now we know that poorly built landfills are ‘point source’ polluters," he said. This means that the landfill is a specific place from which harmful chemicals can enter the water supply.
A newer landfill, Mire said, would be built so the drainage would not reach any surface water or ground water.
Mire will present his ideas at the City Council meeting tonight.

Farm chemicals blamed for pollution

The farm chemicals used by area farmers were blamed for the poor water quality report the county got yesterday.
Tests by a government agency show that this county’s water is not as safe as it was 10 years ago.
Not all the county is involved in farming, but most of the county’s water is affected.
Pollution that comes from the use of farm chemicals is called nonpoint pollution, the official said, because "you can’t tell which fields the chemicals came from."
Once the chemicals are in the ground water, they move with the underground water. Sometimes they even enter the streams. These chemicals become part of the hydrologic cycle, just like the water.
Some of the chemicals can stay in the soil for a long time. Once the pollutants get into the ground water, they are very hard to clean out.
Farmers are encouraged to use chemicals only when the crops need them. They also are encouraged not to apply more than they need. Lawn and garden chemicals can cause the same problems.

Waverly cleanup to cost millions

The contaminated well found at Waverly, Nebraska, will cost millions of dollars to clean up, an official said yesterday.
In 1986 the city well was found to be polluted. It cost $500,000 to drill two new wells and pipe the water two miles to the city.
Now the federal government will have to spend $2 million to $5 million to clean up the soil and ground water around the old well.
The cleanup may take five years.
The polluted water was too dangerous for people to drink so the town had to spend the money for the new wells. The Waverly mayor said that money could have been better spent for other things.
No one knows how the well was polluted. Some officials think the problem started when some stored grain was sprayed with a strong chemical. The spraying was done several years ago.
If that was the cause, the chemicals seeped into the ground and traveled with the water about one-fourth mile to the well.

Waste from factories and animal feedlots are other examples of point source pollution.
In the past, factories often used to pour wastes into a lake or river. Laws now stop factories from doing that.
Wastes from feedlots can run downhill during rains. The wastes then enter streams and other nearby surface waters. Laws also help stop point source pollution from large feedlots.

FYI (For Your Information)

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Application of a farm chemical for weed control

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From the Editor:

We all know that agriculture (farming) is important to the United States. We also need to understand that some farm chemicals can pollute our water supply.

I think every farmer and every homeowner with a lawn or garden should be careful when they handle fertilizers and other chemicals.

It's good to hear that many farmers are using new farming methods which don't require as many chemical sprays and powders. These farmers are using livestock wastes and other natural materials to replace manufactured chemicals.

We need farmers to raise the food we eat and we need a safe supply of water. Everyone must work together to solve this problem.

Letter to the Editor:

New York City, NY

I watch and read everything I can about water. I am very interested in knowing how landfills affect water supplies. Our city recently had a horrible mess. No one would take our garbage!

In New York City we make a lot of garbage every day. Whenever we have even one or two days when they don't pick up the garbage, it is a horrible mess. It also smells really bad! Dear Aqua,

I'm worried about garbage! Lincoln, Nebraska, is putting its new landfill near our farm. My parents are worried that seepage from the landfill will get into our drinking water. I wish they would put the landfill somewhere else, but their minds are made up.

I hope the city will build a landfill that will be safe. It is really important to my family. I hope it's important to the people in Lincoln, too.

Seared to Drink the Water

Hazardous Waste Day Saturday

[What do you think a "hazardous waste" is? (If you don't know, look up both words in a dictionary.) Why do you think the newspaper is announcing this event? Who should be interested in a Hazardous Waste Day?]

Saturday is the city's monthly Hazardous Waste Collection Day. Collection will be at the city garage from 9 a.m. to 3 p.m.

City Water Engineer Melvin Mire said hazardous waste is anything that can cause pollution problems if placed in a landfill.

Directions can help you learn what is hazardous.Read directions carefully.

If hazardous wastes are not handled right, Mire said, the area's water supplies can become polluted.

People need to bring batteries, broken thermometers, insect sprays, cleaning products, extra lawn fertilizers and other pollutants to the collection point.

City officials will dispose of them so that they will not be dangerous to the area water supplies, he said.

Our Farm is Part of a Multi-Media Program Presented by the University of Nebraska Cooperative Extension Service 4-H program. Video tapes, a teacher's guide, and a computer game also are available.

Water Riches was written by Shirley Trout, a farm wife and free lance writer from Waverly, Nebr., under the supervision of Donald D. Siffring, University of Nebraska Extension Specialist, 4-H Youth Development.

Technical consultants were: Delynn Hay, University of Nebraska Extension Specialist, Water Resources and Irrigation, and Deon Axthelm, Professor Emeritus, University of Nebraska Extension Specialist, Water Resources.

The editorial cartoon and comic strip are by Matthew Geier.

A Work is by Renee Lanik.

The mission of 4-H is to assist youth and volunteer staff through informal education that helps them acquire knowledge, develop life skills, and strengthen values that enable them to become increasingly self-directing, productive and contributing citizens.
Mystery message

Clues
First word: verb  
Second word: possessive pronoun  
Third word: adjective  
Fourth word: noun  
Fifth word: verb, past tense  
Sixth word: adjective  
Seventh word: noun

Using the key, complete the message. You may use the clues if you need help.

Key
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

8 1 22 5 25 15 21 18 4 18 9 14 11 9 14 7 23 1 20 5 18

20 5 19 20 5 4 5 22 5 18 25 5 1 18.

Word search
Find and circle the following words. Look left to right, down, and at a diagonal.

aquifer  
between  
conservation  
gravel  
ground water  
hydrologic cycle  
infiltration  
lake  
nonpoint pollution

aquifer  
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conservation  
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nonpoint pollution

Building a glossary

Draw a line from the words on the left to the correct meaning on the right.

aquifer: pollutants that come from a specific place that can be identified
hydrology: the study of water as it relates to the earth
point source pollution: the process by which plants give off water vapor to the atmosphere
nonpoint pollution: a supply of usable ground water stored in the cracks, spaces and pores of underground rock, soil, sand and gravel

Professor Owl

What do you know about water pollution? Freddie...

Well, chemicals, litter, and factory waste can pollute water and make it unfit for any purpose...

What about you, Birtie?

We can prevent this pollution by following instructions on the labels and obeying laws to protect our environment?

How water is polluted

Pure water is made of two parts hydrogen and one part oxygen. However, most water actually contains many more particles than hydrogen and oxygen. This happens when water comes in contact with the soil, plants and air during the hydrologic cycle.

When the particles in the water are not dangerous, water quality is not a problem. Or when the elements are in a small enough amount, they do not affect water quality.

For example, scientists know that tiny amounts of chromium, cobalt and zinc can make a person healthier, but larger amounts can be dangerous.

Only laboratory tests can tell whether the water is safe to drink.

Bubble for thought

If some farm chemicals can pollute local water supplies, why do farmers use them?

Health tip

Drinking water should be tested each year. This is the only way to know if your water is safe to drink.

State laws make towns and cities test their wells regularly.

Private wells should be tested for bacteria and nitrate. Contact your county health department for details.

Words for the day

point source pollution: pollutants that come from a specific place that can be identified
nonpoint pollution: pollutants that do not come from a specific place
How well did you read?

Complete these questions using the following words: nonpoint, hydrologic, feedlots, ground water, pollution, landfills, surface water

1. ________ from chemicals or wastes makes water unsafe to drink.

2. The two types of water supplies are ________ and ________

3. The starting place of pollution cannot be identified.

4. Two possible point source polluters are ________ and ________

5. Pollutants get into ground water during the ________ cycle.

True or false?

1. Water must be completely pure for it to be safe to drink. ________

2. Gasoline should never be poured down a drain. ________

3. Feedlots can add to point source pollution. ________

4. Once a chemical touches the ground it can no longer be dangerous to a water supply. ________

Map exploration

1. Locate Waverly on the Nebraska map.
2. What county is it in? ________
3. Is Waverly along a river? If so, which one? ________
4. What is the city nearest Waverly? ________
5. Why is that city (answer 4) special to Nebraskans? ________
6. Now locate Gibbon. ________
7. What county is it in? ________
8. Is it near a river? ________
9. If so, which one? ________
10. What is the city west of Gibbon? ________

Beat the editor

The editor is the boss of the newspaper. You are the reporter and have to do what the editor says. This time, however, the editor is going to let you try to beat her.

The editor of Water Riches is challenging you to a contest to see who can make the most words from the words:

point source pollution

The editor made 15 words (including one with only one letter). See if you can do better. The person with the most words in your class is the winner.

Be sure to correctly spell the words. Any misspelled words don't count.
4th grade classroom turns into newsroom

The fourth grade class has become a newspaper staff. The students are writing stories about water quantity and water quality. They are preparing a newspaper as a final project of Water Riches, a 4-H program. Students have been given jobs just like in a real newspaper office. Some are editors, reporters, advertising copy writers, artists and distribution managers. Some are doing other jobs important to producing the newspaper. The paper will be distributed (fill in where paper will be distributed — throughout the school, throughout a neighborhood, around town, etc.)

The newspaper staff hopes to make readers become more careful about using water.

Now it's your turn

Now you are the reporter! This issue of Water Riches gives you the information you need for your assignment. Your assignment is to write, print and deliver a class newspaper dealing with water. Your teacher will help you decide who will get the paper after you have printed it. Your writing assignments will be about water and how to conserve it. Some will be about the quantity of water. Others will be about the quality. Do the best job you can. Your editors will need good work for the final newspaper.

The illustrations on this page as well as in previous issues will help you complete your assignments. When preparing the newspaper, remember to create and include illustrations and charts.

All life needs water

Fourth graders learned in the Water Riches 4-H program that every living thing needs water to live. That includes animals and plants. They also learned that agriculture is the biggest user of water and that most of its water is used for irrigation. Off the farm, people use the most water for lawn care. Many plants do not need much water to live. By planting less thirsty grasses, plants, and trees, a family can use less water and still have a beautiful lawn.

Using less water is called "conservation." Water conservation is very important for making sure there will be enough water in the future.

Water Uses

These numbers tell how many gallons of water you use every time you do these things. You can use less water if you are careful.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold drinking water</td>
<td>2-5 gallons</td>
</tr>
<tr>
<td>Brushing teeth</td>
<td>1 gallon</td>
</tr>
<tr>
<td>Washing dishes by hand</td>
<td>20 gallons</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>10-20 gallons</td>
</tr>
<tr>
<td>Clothes washer</td>
<td>30 gallons</td>
</tr>
</tbody>
</table>

Cold drinking water — 2-5 gallons down the drain while you wait for the water to get cold
brushing teeth — 1 gallon if you let the water run while you're brushing
washing dishes by hand — 20 gallons if you leave the water running (You use a lot less if you trap the water in the sink!)
dishwasher — 10-20 gallons
Clothes washer — 30 gallons

Use less water

"Conservation is the key to saving the world's water supplies," conservationist Vanna Slovski told reporters yesterday. Slovski is on a worldwide tour to promote water conservation. People have known about the problems of water quantity and quality for many years, she said, "and now it's time for action!"

"A family with two parents and two children uses about 150,000 gallons of water each year! Most of that water is used in the bathroom," she said, "so that is where families should start saving water."

As a reporter, you need to be thinking of what questions to ask. You can't write a good article with only part of the information. What questions do you have about water conservation (quantity and quality, remember)? What other questions do you have about water? Write down these questions. Be ready to ask your teacher and classmates.
Dear Saving,
That was a wonderful letter!
It really makes me happy to hear that people really do care about the water they use.
I'll give you one more hint for the bathroom: Don't use the toilet for a waste basket. That may sound funny. But a lot of people throw things away in the toilet and then flush them away.
Remember that every time you flush the toilet you are using 5 to 7 gallons of water. Save that water if a waste basket will do.

Water: Do we have enough to waste it?

As a reporter, you must understand the things around you. If your assignment is to write about a drought, will you be telling people how to use less water or less water? (Circle the right answer)

1. _______ When people use more water than necessary, what is that called?
2. _______ Fertilizing the lawn cannot affect groundwater. True? False? (circle one)
   - I never had thought about
   - as wasting water before
3. _______ Three ways to save water outside are:
   1. _______
   2. _______
   3. _______

Three ways to save water outside are:

1. _______
2. _______

Do your research
You are the reporter. You need to know the three forms of water so you can explain them in future news stories.

What are the three forms of water?

1. _______
2. _______
3. _______

Which form cannot be seen?
Become a journalist for a day

Subject
What happens to those chemicals?

Facts
Chemicals are often pollutants.
Water supplies can be made unsafe to drink.
Both ground water and surface water can become polluted.
The two types of pollution are point source pollution and non-point pollution.

Reporting assignment
Write an article connecting the headline to the facts. Remember, you are writing a news story. The readers do not know anything about chemicals or water supplies so you have to tell them. (Hint: Write a sentence telling what a pollutant is. Next, tell where water is stored [two places]. Then tell how pollution and water supplies are important to each other. Now tell your readers how pollutants can get into the water supply.)

Art assignment
Using the facts listed in the Reporting assignment, draw a picture of chemicals polluting water. Use arrows to show how the chemicals move from the soil to the water supplies. Be sure you include both types of water supplies.

Professor Owl

Art assignment
Create an advertisement for water conservation. Use no more than 20 words. Be sure to place the words so that they look like an ad.
Look through this issue of Water Riches. It has plenty of hints for messages you can use.
The pictures (if you use any) should be clear and should tell the same story that the words tell.
Be creative! No one will read a boring ad.

Word for the day
water conservation: not wasting water and protecting water supplies from pollution.
How well did I read?

Remember discussing the hydrologic cycle in Unit 2? In that you learned that a cycle has no beginning and no end. Use the words listed below to correctly label the drawing of the hydrologic cycle.

1. __________________
2. __________________
3. __________________
4. __________________
5. __________________
6. __________________
7. __________________
8. __________________
9. __________________

Let's review

Answer the following questions using the information in the Water Riches newspaper.

A pollutant is (good/bad) for the environment. (Circle correct answer)

Circle the letter for the water cycle in nature is the _______ cycle.

Circle the letter in the following pairs of activities that helps SAVE water.

a. washing dishes by hand, without the water running constantly
b. washing dishes in the dishwasher

a. giving extra fertilizer to a neighbor to use on his yard
b. dumping extra fertilizer into the street to be washed away

a. hosing off the driveway or porch to remove trash and leaves
b. sweeping the driveway or porch to remove trash and leaves

Building a glossary

Below are the Words for the Day from all issues of Water Riches. Draw a line from the word on the left to the correct meaning on the right.

aquifer
hydrology
nonpoint pollution
point source pollution
transpiration
water conservation

the study of water as it relates to the earth
the process by which plants give off water vapor to the atmosphere
a supply of usable groundwater stored in the cracks, spaces and pores of underground rock, soil, sand and gravel
pollutants that do not come from a specific place
pollutants that come from a specific place that can be identified
not wasting water and protecting water supplies from pollution

Conservation tips

Lawn and Garden:
Check hoses for leaks.
Remove weeds before they get large.
Water early in the morning.
Don't water too often.
Don't water if the weatherman says rain is coming.
Don't water the sidewalk or driveway. (Concrete won't grow no matter how much water you put on it!)

Plant "less-thirsty" grasses, trees and shrubs — those that take less water to live and grow. Ask someone at a garden center or Extension office about which plants are best.