The Water Cycle

A Science A–Z Earth Series

Word Count: 1438

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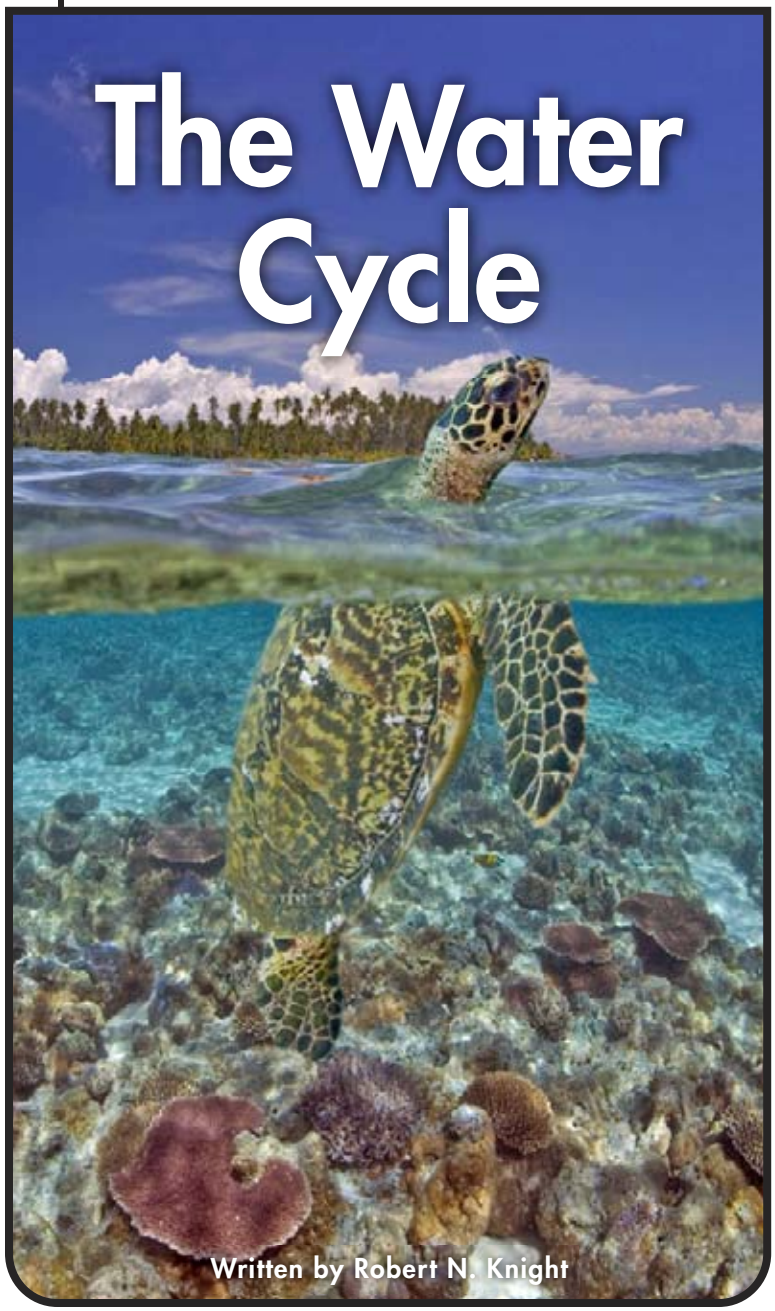

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The Water Cycle

Written by Robert N. Knight

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KEY ELEMENTS USED IN THIS BOOK
The Big Idea: Understanding the water cycle is crucial to understanding how what we do—polluting, farming, damming, using, wasting, conserving—affects everyone's water.
Key words: cloud, condense, conservation, cycle, dam, delta, deposition, Earth, energy, erosion, evaporation, flow, freeze, fresh water, gas, glacier, groundwater, hail, ice, irrigation, lake, liquid, matter, melt, ocean, precipitation, rain, river, runoff, salt water, sandbar, sediment, sleet, snow, soil, solid, storm, stream, surface water, temperature, water, water cycle, water vapor, well **Key comprehension skill:** Cause and effect *Other suitable comprehension skills:* Sequence events, Main idea and details, Interpret charts, graphs, and diagrams, Author's purpose **Key reading strategy:** Summarize *Other suitable reading strategies:* Visualize, Connect the text to prior knowledge, Retell, Ask and answer questions

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Written by Robert N. Knight

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Cirrus clouds

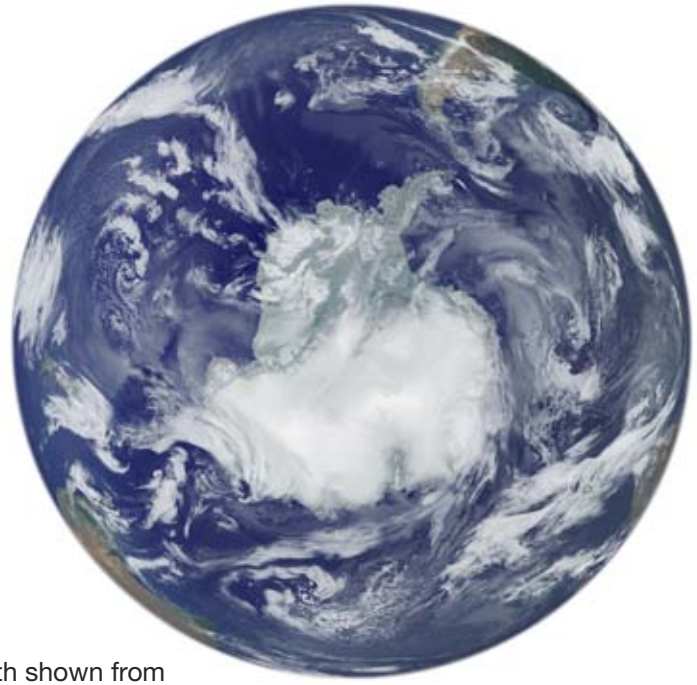
Table of Contents

Introduction: Water Everywhere

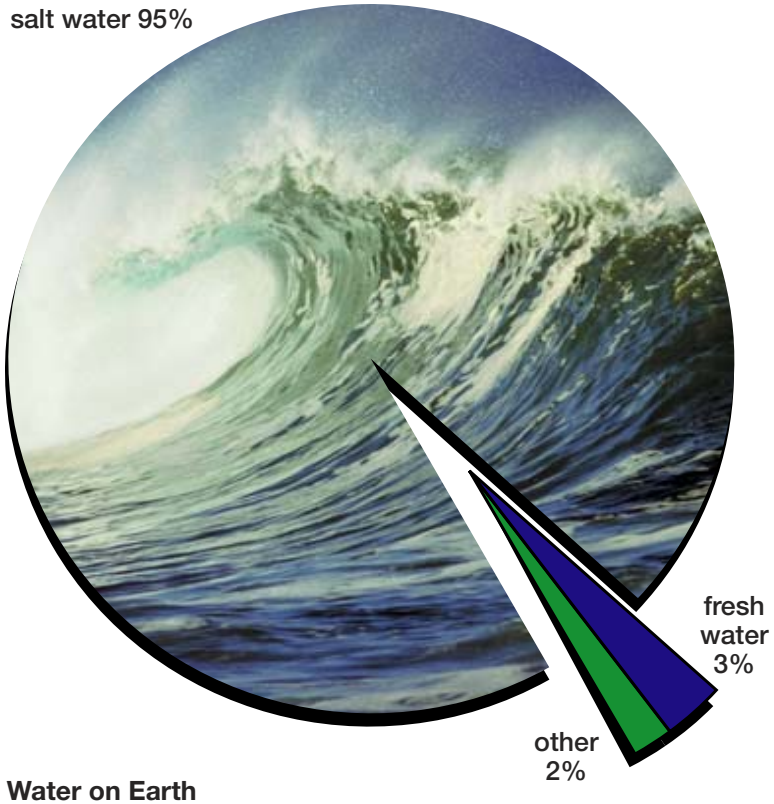
Water covers three-fourths of Earth's surface. This is why Earth is called the water planet.

Each year, more and more people live on Earth. They use more and more water. They cause dirt to get into Earth's water. This makes clean water more precious.

This book will teach you about how Earth's water moves and changes. It will teach you how we use water and how we can conserve it.



Earth shown from above Antarctica



Water on Earth

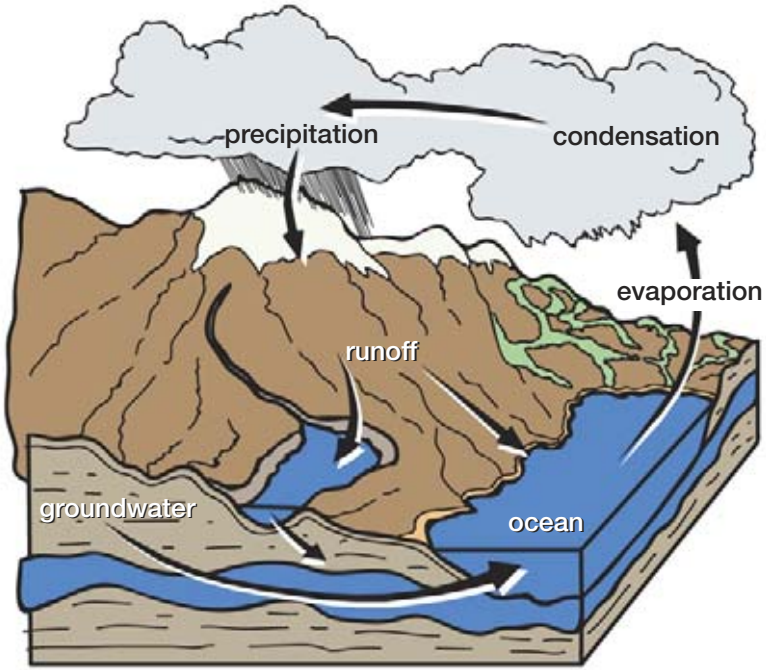
The world's oceans hold most of Earth's water. However, this water is salt water. Salt water is not good to drink or water plants with.

A very small amount of Earth's water is not salt water. Fresh water is in lakes, rivers, and streams. Some of it is found below the ground and high in mountains, too. But most fresh water is found in the form of ice around the North and South Poles.

The Movement of Water

Everything on Earth is matter. The three states of matter are solid, liquid, and gas. Earth's water is found in all three of these states. Solid water is called ice. Water that is a gas is called **water vapor**. You cannot see water vapor. Liquid water is the water you drink and see fall as rain.

Earth's water moves all around Earth. As it moves, it changes states. This movement is called the **water cycle**.



Water evaporates into the air, forms clouds, and precipitates down. On the ground, water flows downhill until it meets the ocean.

Evaporation and condensation

The first step in the water cycle is when the Sun shines on the water. This sunlight is energy. Some of that energy then passes to the tiny particles that make up water. The particles get more and more energy from the sunlight. They move faster and faster. When they move fast enough, they leave the water, and they move into the air above the water. This is called **evaporation**. Evaporation is when liquid water changes to water vapor.

Warm air near Earth's surface rises. As it rises, it cools. The tiny water particles in the cool air slow down and get closer together. They begin to gather on tiny bits of dust that are floating in the air. As water particles collect on the dust, they form water droplets. This is **condensation**. That's the next step in the water cycle.

When millions of these water droplets come together, they form clouds. The more water droplets that come together, the thicker the clouds become. When clouds become very, very, thick, they can form storm clouds.

Yosemite Valley on a clear and a cloudy day

Word Wise

Different clouds have different names. The names of clouds come from Latin words. Here are some Latin words that are used to name clouds.

cirro = high
cirrus = feathery
cumulus = fluffy
alto = mid-level
stratus = layers
nimbus = rain or snow

Cumulonimbus:
large fluffy rain clouds

Nimbostratus:
thick layers of rain clouds

Altocumulus:
mid-level fluffy clouds

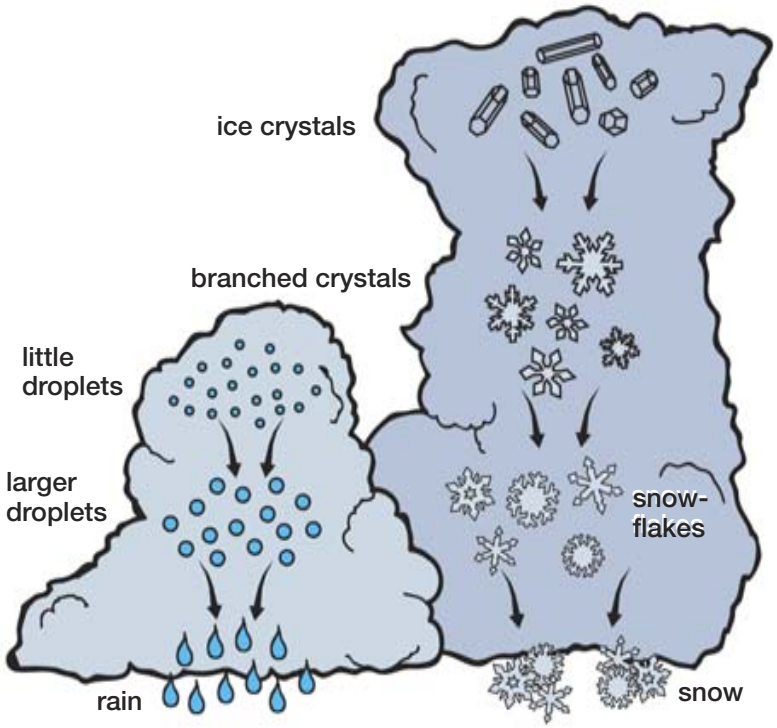
Cirrostratus:
high layers of clouds

Cirrus:
feathery clouds

Precipitation

Rain, snow, sleet, and hail come from clouds. They are called **precipitation**. That's the next step in the water cycle.

The kind of precipitation that falls depends on the temperature inside a cloud. If it is above freezing, raindrops will form. If it is below freezing, water droplets freeze into tiny pieces of ice. These pieces of ice join together to make snowflakes.

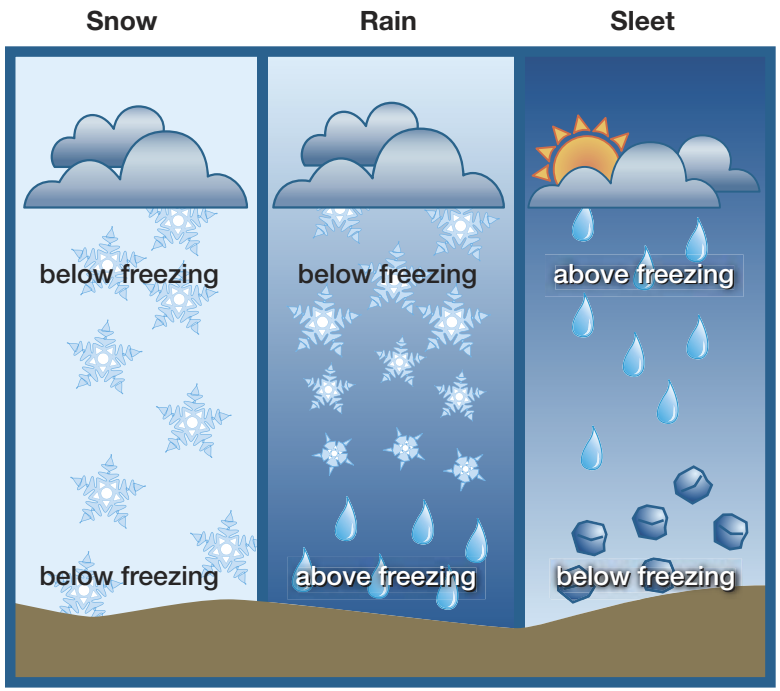


Conditions for rain and snow inside a cloud

Sometimes rain freezes as it falls to the ground. It then becomes sleet. Other times snow may melt as it falls to the ground. Then it becomes rain.

What happens to rain and snow depends on how cold it is below a cloud. The picture shows what happens with different temperatures inside and under a cloud.

Sometimes the ground is freezing. Then rain turns to ice after it falls.



The air temperature in and below the cloud, and above the ground, affects precipitation.

Water on the Ground

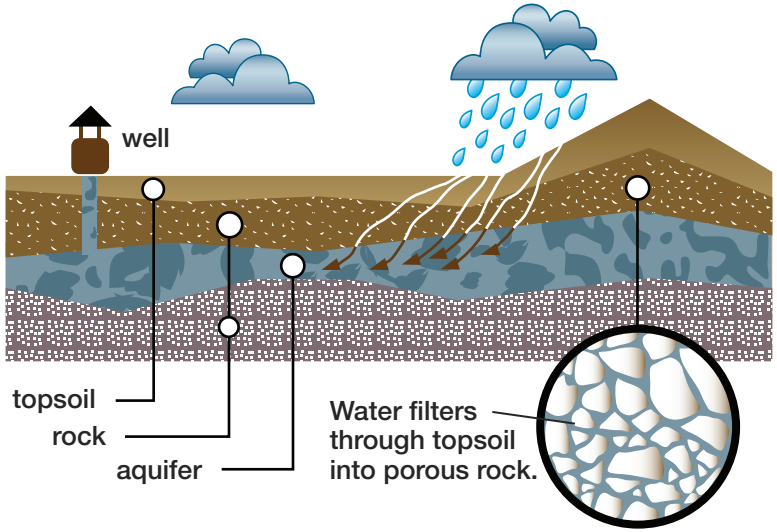
Rain and snow that fall to Earth will either soak into the ground or flow over it.

Water flowing over the ground is **surface water**. Much of it ends up in streams and rivers. The surface water that collects in rivers and streams is **runoff**. The streams and rivers carry this water to lakes and oceans.

The water that soaks into the ground is called **groundwater**. It fills up spaces between rocks, sand, and dirt.

Snow falling near the Poles and high in mountains piles up. If it does not melt over time, it forms huge ice sheets and glaciers.

Aerial view of water running off land into streams



Many people get the water they need from groundwater. Wells are drilled into the ground to get drinking water. These wells will go dry if the water is pumped out too fast. Rain and melting snow cannot always replace the water that is removed.

Chemicals dumped on the ground can seep into groundwater. It is impossible to get them out, once they get into groundwater. We must stop this dumping.

WOWSER!

The human body is almost 70% water. There wouldn't be much of you left, if the water evaporated.

Erosion

Surface water can move over land with a lot of force and speed. The fast moving water can cut away rock and soil. This is called **erosion**. The rock and soil is dumped into streams and rivers.

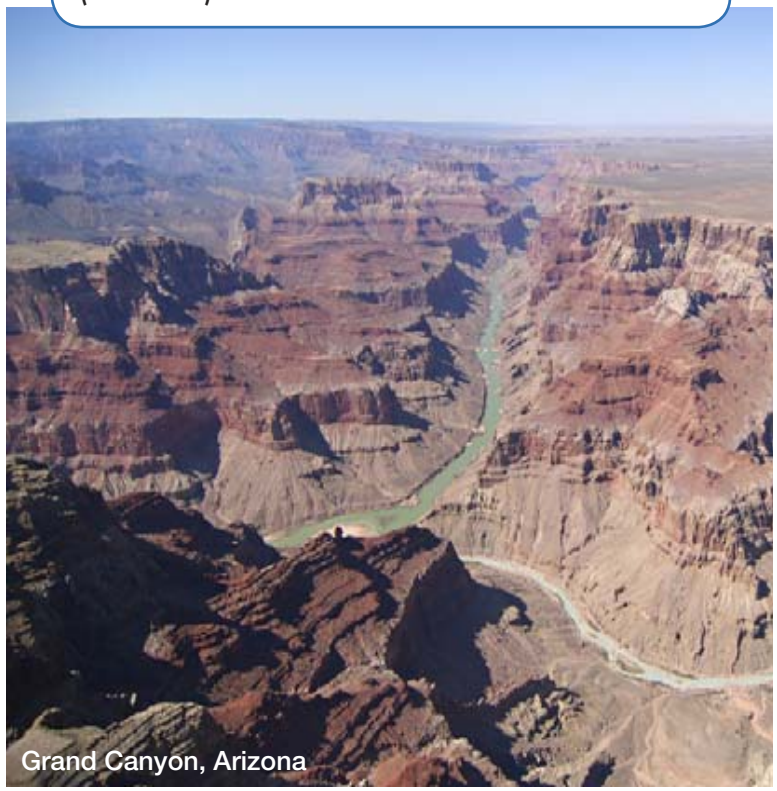
Erosion can rob land of rich topsoil needed to grow good crops. When farmers plow land, the soil is exposed. When fires burn down trees, forest soil is exposed. Heavy rain can wash away the exposed soil.

Planting plants to help hold down soil is the best way to stop erosion. This is especially important in places where there are lots of hills.


Erosion cuts away rock and soil.

WOWSER!

The Grand Canyon is over 1.6 kilometers (one mile) deep and up to 30 kilometers (18 miles) wide. That's a lot of erosion!



Grand Canyon, Arizona

This is a picture of the Grand Canyon. It is very deep. Fast moving river water cut through rock and formed the canyon. The canyon took about a million years to form. The river is still working to make the canyon even deeper. Fast moving water has formed canyons and valleys all around the world.

Deposition

Streams and rivers carry **sediment** that runs off the land. When streams and rivers slow down, the sediment gets deposited. This is called **deposition.**

Rivers and streams twist and turn on their way to the ocean. Water slows down on the inside part of a turn. Sediment is deposited in the inside bank of the turn. This sediment makes a **sandbar.**

Rivers slow down when they go into the ocean. Sediments carried by a river are deposited. The sediment forms large areas of land called **deltas.** Deltas are good places to grow crops.

The Nile Delta in Egypt, and delta farmland

An ancient irrigation system

A modern irrigation system

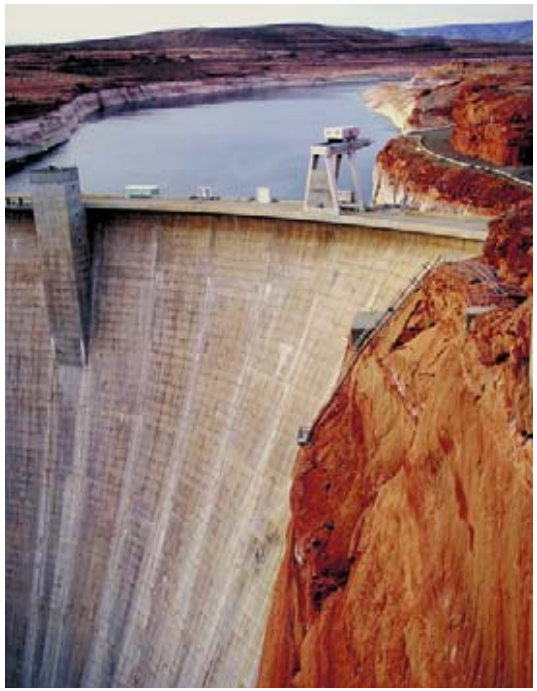
Controlling Water

If there is not enough water, people can dig ditches and canals. The ditches and canals bring water to the people. People can also build dams and ponds. Dams and ponds store water. Systems that channel and store water are called irrigation systems. Long ago, farmers built irrigation systems much like irrigation systems used today.

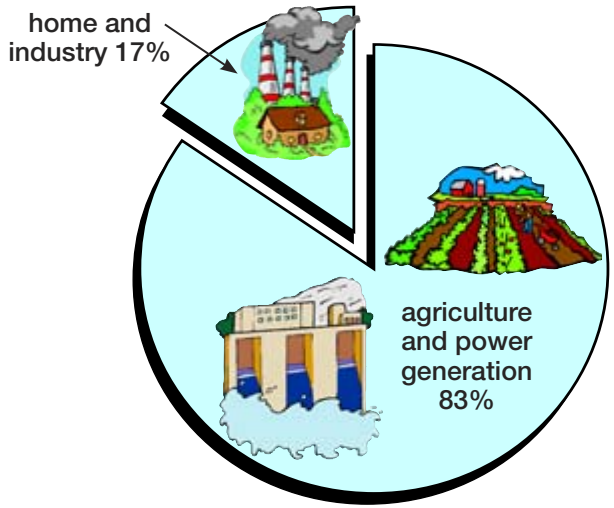
Today, water is used in many different ways. It is stored behind dams in lakes for use during times when there is not a lot of rain. It is carried long distances in pipes that have been placed into the ground.

Irrigation systems allow farmers to grow plants almost anywhere. We can even grow crops in the desert.

Water that has been used is sent to sewage treatment plants. Treatment plants clean the water and put it back into the water cycle.



Glen Canyon Dam at Lake Powell in Arizona



Water Uses

Most of Earth's fresh water is in polar ice and in mountain glaciers. It cannot be easily used. Only about one percent of Earth's fresh water is easy to get and to use.

Fresh water is important because it is used for many things. It is used to water crops. Industries also use a lot of fresh water when they make things.

People at home use fresh water to drink, to clean, to cook, and to water plants and lawns. The number of people on Earth is growing, so every day, more water is needed. But there is only so much fresh water on Earth.

Water Conservation

Where will we get our fresh water in the future? We can dig deeper wells. We can build factories that change salt water into fresh water.

Scientists and inventors can find ways to save water. They have invented toilets that use much less water. They also have invented showerheads that use less water. People can now put home irrigation systems on timers. These systems give the right amount of water directly to each plant.

People can learn how to save water. They can learn that there is only so much fresh water on Earth, so it must be used wisely.

A factory that removes salt from salt water

Things people can do to save water:

- Turn off the water when you're not using it.
- Don't run water when you brush your teeth.
- Take shorter showers.
- Fix leaking faucets.
- Wash dishes and clothes only when there is a full load.
- Store rainwater for plants.
- Water the lawn in the evening.
- Put lawn sprinklers on timers.

Conclusion

You have learned how important water is to life on Earth. You have learned about the water cycle and how water changes states as it move through this cycle. You have also learned that water changes the way Earth looks. It cuts canyons and valleys. It forms rivers and oceans.

Water is our most important resource. We must keep it clean, and we must not waste it.

A Hawksbill Turtle surfacing

Glossary

condensation the process by which water changes from a gas to a liquid state (p. 8)

delta an area of land formed by sediment at the mouth of a river (p. 16)

deposition the act or process by which wind or water sets down sediment (p. 16)

erosion the gradual wearing away of rock or soil by water, wind, or ice (p. 14)

evaporation the change of water from a liquid state to a gas state, due to an increase in temperature (p. 7)

groundwater water held underground in soil or rock, often feeding springs and wells (p. 12)

precipitation water that falls from clouds in the form of rain, snow, sleet, or hail (p. 10)

runoff excess water, not absorbed by the soil, that flows downhill (p. 12)

sandbar a long ridge of sand formed in a body of water by currents or tides (p. 16)

sediment particles of dirt and rock that are carried by water, wind, or ice and deposited elsewhere (p. 16)

surface water water found above ground, on land (p. 12)

water cycle the path water takes, and the changes it goes through, as it cycles through the environment (p. 6)

water vapor the gaseous state of water (p. 6)

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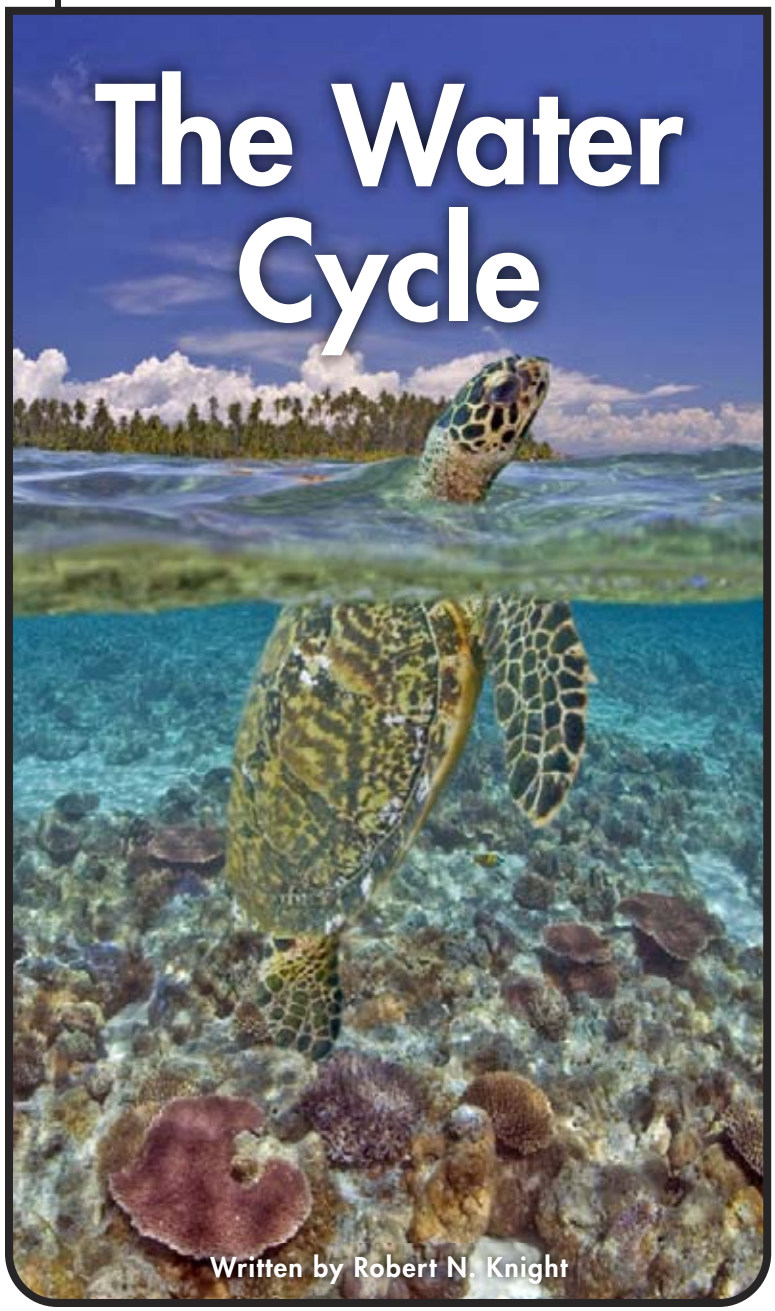

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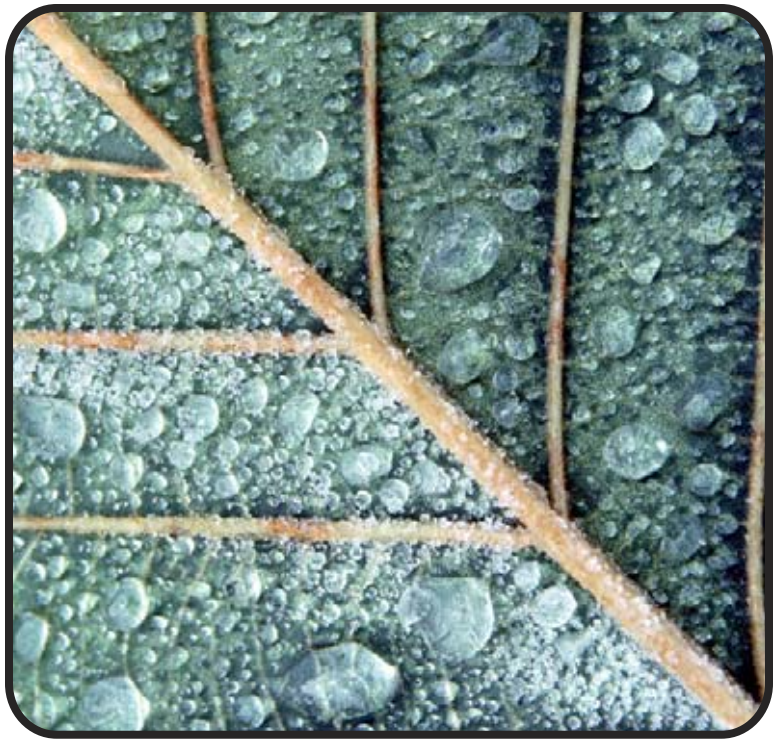

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Key words: absorb, aquifer, cloud, condensation, conservation, cycle, dam, delta, deposition, Earth, energy, erosion, evaporation, flow, freeze, fresh water, gas, glacier, groundwater, hail, ice, irrigation, lake, liquid, melt, ocean, polluted, precipitation, rain, river, runoff, salt water, sandbar, sediment, sleet, snow, soil, solid, state of matter, storm, stream, surface water, temperature, water, water cycle, water molecule, watershed, water vapor, well **Key comprehension skill:** Cause and effect *Other suitable comprehension skills:* Sequence events, Main idea and details, Interpret charts, graphs, and diagrams, Author's purpose **Key reading strategy:** Summarize *Other suitable reading strategies:* Visualize, Connect the text to prior knowledge, Retell, Ask and answer questions

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Cirrus clouds

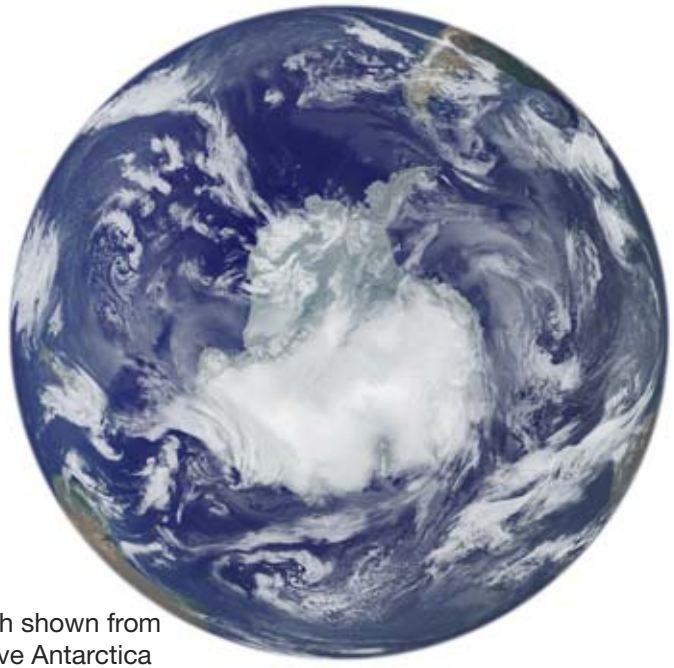
Table of Contents

Introduction: Water Everywhere

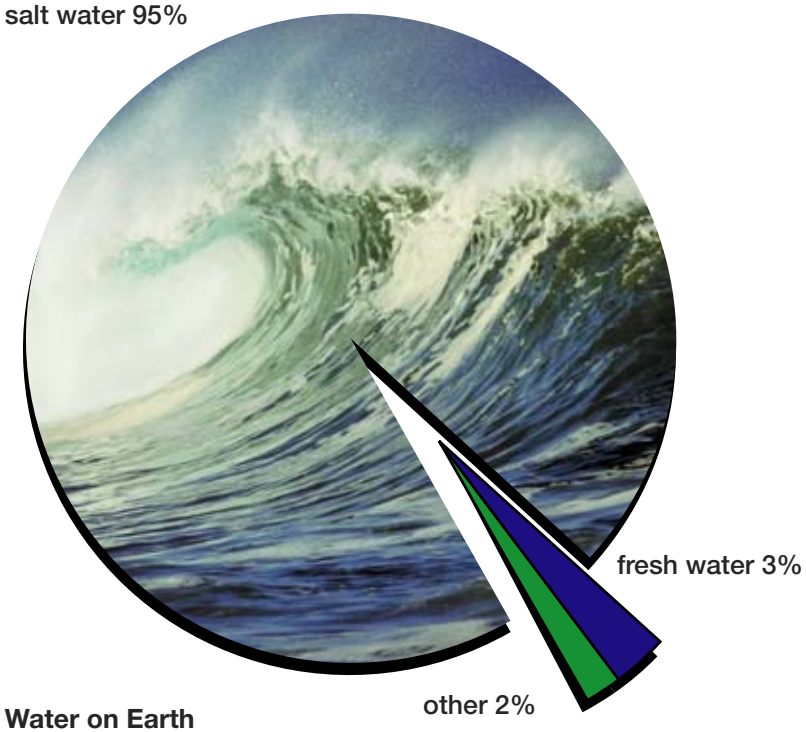
Water covers three-fourths of Earth's surface. Other planets have only traces of water or no water at all. This is why Earth is called the water planet.

As the number of people on Earth increases, more water is used. More people also means more pollution. Earth's fresh water becomes more and more precious.

In this book, you will learn about how Earth's water moves and changes. You will also learn how it is used and why it must be protected and conserved.



Earth shown from above Antarctica



Water on Earth

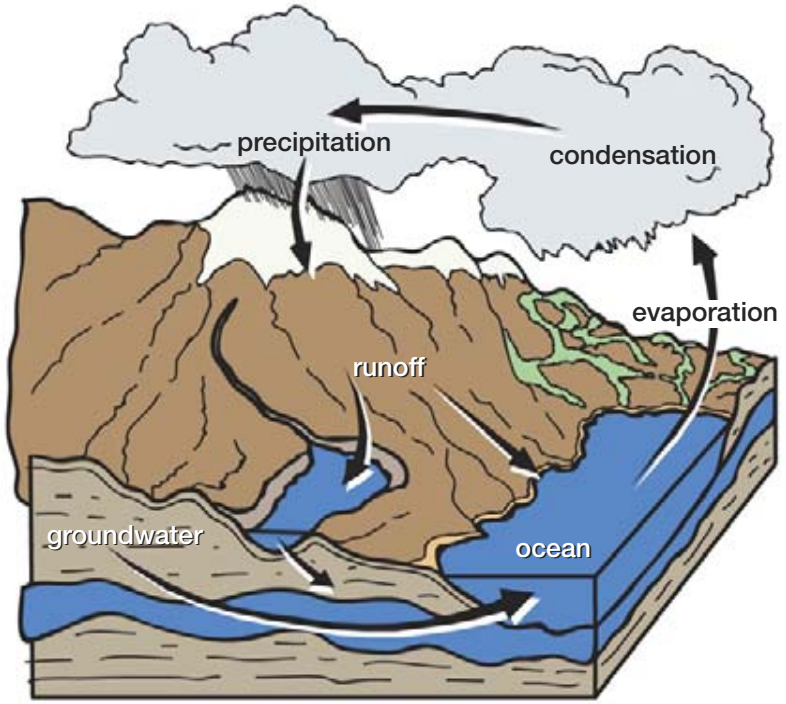
The majority of Earth's water is found in the oceans that cover most of Earth's surface. Ocean water has lots of minerals. These minerals make ocean water taste salty. Therefore ocean water is called salt water.

The water that is not found in the oceans is called fresh water. Only 3% of Earth's water is fresh water. Fresh water is found in lakes, rivers, and streams. It is also found under the ground. Most of Earth's fresh water is ice. It is found around the North and South Poles in ice sheets and icebergs. It is also found in mountain glaciers.

The Movement of Water

Everything on Earth is made of matter. The three states of matter are: solid, liquid, and gas. Most water on Earth is liquid. Some of it is solid ice, and some is a gas we can't see. It is called **water vapor**.

Earth's water moves in a cycle called the **water cycle**. As it moves from place to place, it changes from liquid to gas and gas to liquid. It also changes from liquid to solid and from solid to liquid.



Water evaporates into the air, forms clouds, and precipitates down. On the ground, water flows downhill until it meets the ocean.

Evaporation and condensation

Water needs energy to change from liquid to gas and solid to liquid. The energy it needs comes from the Sun.

When water changes from liquid to water vapor, it is called **evaporation**. This is the first step in the water cycle. Sunlight hits water on Earth's surface. Tiny particles that make up water, called **water molecules**, absorb some of the light energy and begin to move. As they get more energy from the Sun, they move even faster. When they get enough energy, they escape the liquid water and go into the air as water vapor.

When warm air near Earth's surface begins to rise, it cools. As the air cools, the water molecules in the air begin to slow down and loose energy. They collect on dust particles floating in the air. These molecules join other molecules and form tiny water droplets. As they lose energy, they change back to a liquid. This is called **condensation**. That's the next step in the water cycle.

As more and more water droplets gather on dust particles, clouds begin to form. As more droplets form, the clouds get thicker and thicker. The clouds can get so thick that they form thick, dark storm clouds.

Yosemite Valley on a clear day and a cloudy day

Word Wise

Different clouds have different names. The names of clouds come from Latin words. Here are some Latin words that are used to name clouds.

cirro = high
cirrus = feathery
cumulus = fluffy
alto = mid-level
stratus = layers
nimbus = rain or snow

Cumulonimbus:
large fluffy rain clouds

Nimbostratus:
thick layers of rain clouds

Altocumulus:
mid-level fluffy clouds

Cirrostratus:
high layers of clouds

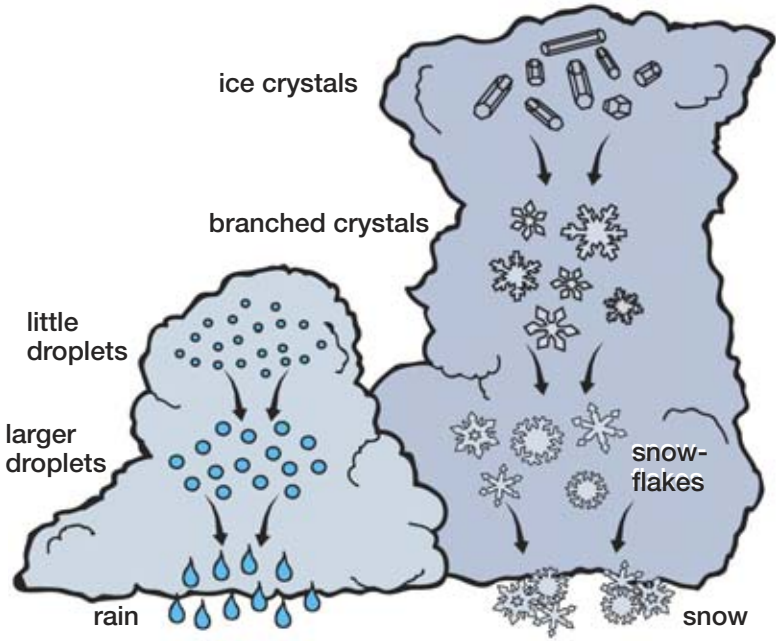
Cirrus:
feathery clouds

Precipitation

Clouds can bring rain, snow, sleet, or hail. Each of these is a type of **precipitation**. That's the next step in the water cycle.

Rain forms when air inside a cloud gets cold and droplets get closer together. Little droplets join to make big droplets, and big droplets become raindrops. When they get too heavy to stay in the air, they fall to the ground as rain.

When the air in a cloud freezes, water droplets turn into ice crystals. These ice crystals join together and fall to Earth as snowflakes.

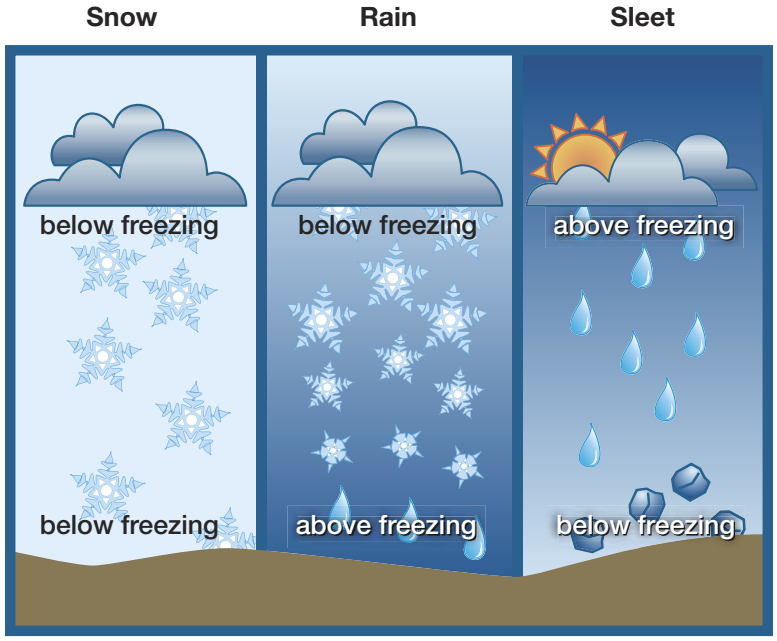


Conditions for rain and snow inside a cloud

Precipitation can change after leaving a cloud. Sometimes rain freezes after leaving a cloud. Then it becomes sleet. This happens if the temperature beneath the cloud is below freezing.

Other times snow melts on its way down to Earth and becomes rain. This happens if the temperature of the air beneath the cloud is above freezing.

If the temperature on the ground is freezing, rain will freeze after it falls from the clouds. Everything gets covered with ice. We call this an ice storm.



The air temperature in and below the cloud, and above the ground, affects precipitation.

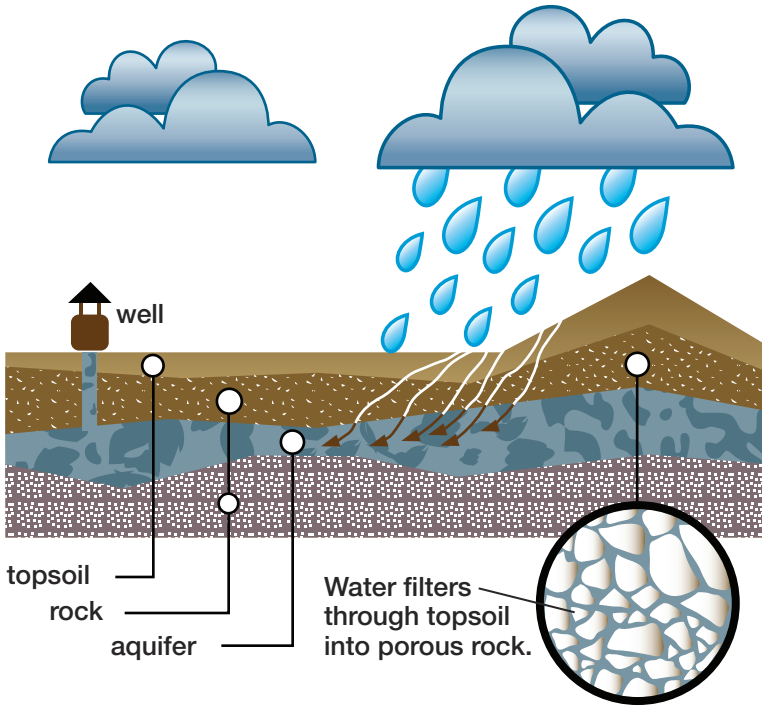
Water on the Ground

Most precipitation reaches the ground. When it does, it often flows over the ground, or soaks into the ground.

Water flowing over the ground is **surface water**. Surface water flows from high land to low land, eventually to the ocean. Since it runs off the land, it is called **runoff**. The area of land from which water runs off into streams and rivers is known as a **watershed.**

Water that soaks into the ground becomes **groundwater**. It travels through the tiny spaces between particles of rock, sand, and dirt. Areas where large amounts of groundwater collect are called **aquifers**.

Aerial view of water running off land into streams



Groundwater is an important source of fresh water for many people. Water wells are drilled into the ground to get fresh water for drinking and other uses. If they take water out faster than rain and snow can replace it, wells can dry up.

Sometimes people dump harmful chemicals onto the ground. These chemicals can follow the same path as the groundwater. The groundwater then becomes polluted. We must take steps to stop dumping harmful chemicals onto the ground. Once chemicals get into the groundwater, it is hard to get them out. This reduces Earth's supply of fresh water.

Erosion

Sometimes surface water moves across land with lots of speed and force. This fast moving surface water has the power to wear away rock and soil. This is called **erosion**. Eroded rock and soil often end up in rivers and streams.

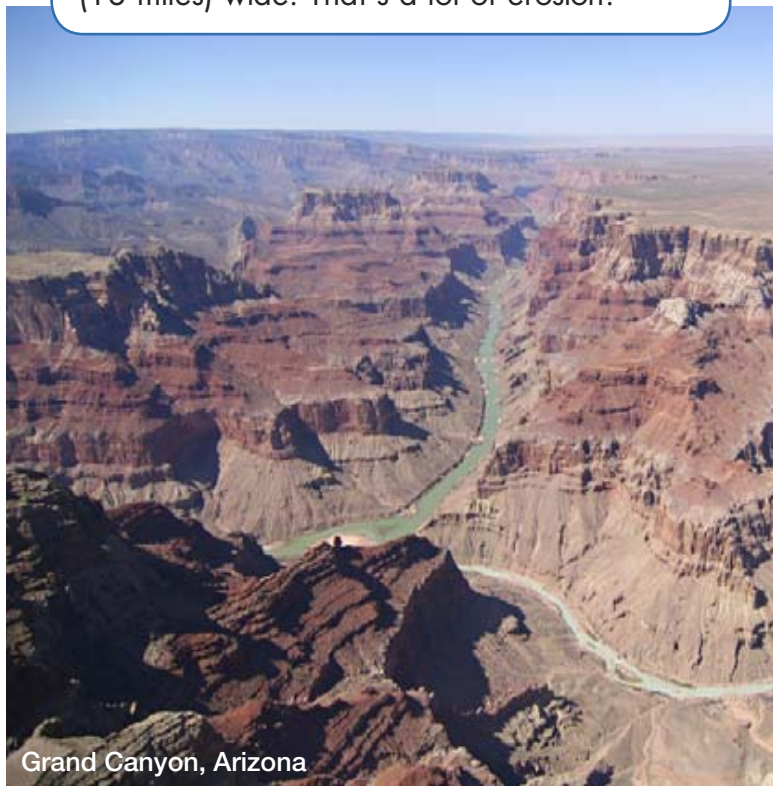
Farmers and foresters worry about erosion. It can remove valuable topsoil from land. Plowing fields and cutting and burning down trees exposes the soil. Heavy rain can carry the soil away and dump it into rivers and streams.

The best protection against erosion is to keep plants growing in the ground. The roots of plants keep the soil tight. Planting crops across a hillside can help, too. Replacing trees that have been cut down also helps to keep soil in place.


Erosion cuts away rock and soil.

WOWSER!

The Grand Canyon is over 1.6 kilometers (one mile) deep and up to 30 kilometers (18 miles) wide. That's a lot of erosion!



Grand Canyon, Arizona

The Grand Canyon is a very deep and beautiful canyon. It was formed when fast moving river water eroded soft layers of rock. Many of the world's canyons and valleys have formed in this same way. It took about a million years for the river to make the Grand Canyon. The river and runoff remove bits of rock and soil every day.

Deposition

The sand and soil, or **sediment**, is carried into streams and rivers by runoff. The river carries it downstream. Wherever the moving water slows down, some of the sediment is deposited. This is known as **deposition**.

Deposition of river sediment causes two kinds of land formations. Rivers bend and turn, and the water slows down on the inside of the curve. Sediments are deposited along the inside bank to form a **sandbar**.

Rivers also slow down when they enter a large lake or ocean. There are large deposits of sediment, called **deltas**, in these areas. Deltas are made of rich topsoil and make good farmland.

WOWSER!

The human body is almost 70% water. There wouldn't be much of you left, if the water evaporated.

The Nile Delta in Egypt, and delta farmland

An ancient irrigation system

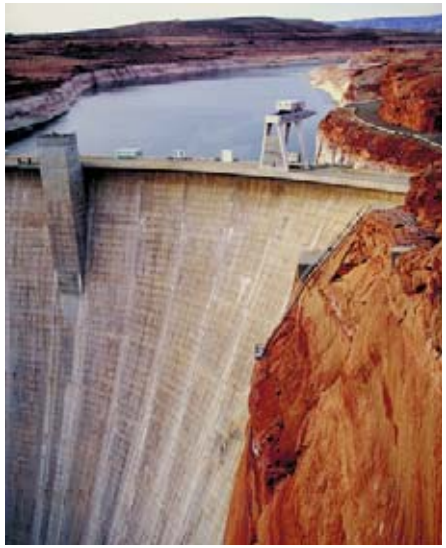
A modern irrigation system

Controlling Water

People need water. For years they have settled in areas where there is plenty of water. Where there was not enough water, they built canals and ditches to bring water to them. They built dams and ponds to store water.

Farmers have built many kinds of irrigation systems to bring water to their crops. Farmers have even used irrigation to grow crops in desert areas.

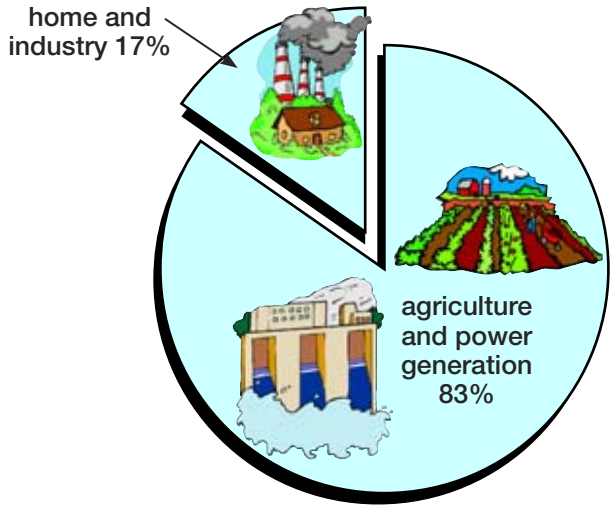
Modern dams have been built that are hundreds of feet high. They are used to prevent floods, to store water for use during drier times, and to make electricity. We also have put large pipes into the ground to carry water long distances.



Glen Canyon Dam at Lake Powell in Arizona

Water used in homes and factories is sent to sewage treatment plants. It is cleaned and then returned to the water cycle.

A water treatment plant



Water Uses

Most of Earth's fresh water is frozen in polar ice and mountain glaciers. Only about one percent is available for living things to use.

Fresh water is important because it is used for many things. The United States uses 40% of its fresh water to water crops. Industries use water for cooling things down, or for cleaning things. People use lots of fresh water for drinking and bathing. They use it for cooking, cleaning, and watering plants, too.

In some parts of the world, clean water is hard to get. As the world's population continues to grow, fresh water becomes even more valuable.

Water Conservation

Where will our future fresh water come from? Some people are digging deeper wells to find more water. Other people are building factories that change salt water into fresh water. Water from these sources is more expensive than most fresh water today.

Scientists are discovering ways to conserve water. For example, they have invented toilets that use very little water. Some irrigation systems are now placed on timers. And they deliver the right amount of water directly to each plant.

People can learn that there is a limited supply of fresh water. They can learn how to conserve water.

A factory that removes salt from salt water

Things people can do to save water:

- Turn off the water when you're not using it.
- Don't run the water when you brush your teeth.
- Take shorter showers.
- Fix leaking faucets.
- Wash dishes and clothes only when there is a full load.
- Collect rainwater for plants.
- Water the lawn in the evening.
- Put lawn sprinklers on timers.
- Put in drip systems.

Conclusion

Without water our planet would be a wasteland. Water and air are the most important resources for living things.

Water changes the way Earth looks. It forms river, lakes, and oceans. It builds valleys and canyons.

Water is constantly on the move. It changes states between liquid, gas, and solid. The water cycle brings us clouds and precipitation.

There is very little fresh water on Earth. It is very important to keep it clean and not waste it.

A Hawksbill Turtle surfacing

Glossary

aquifer an underground layer of rock, sand, or other material through which groundwater flows (p. 12)

condensation the process by which water changes from a gas to a liquid state (p. 8)

delta an area of land formed by sediment at the mouth of a river (p. 16)

deposition the act or process by which wind or water sets down sediment (p. 16)

erosion the gradual wearing away of rock or soil by water, wind, or ice (p. 14)

evaporation the change of water from a liquid state to a gas state, due to an increase in temperature (p. 7)

groundwater water held underground in soil or rock, often feeding springs and wells (p. 12)

precipitation water that falls from clouds in the form of rain, snow, sleet, or hail (p. 10)

runoff excess water, not absorbed by the soil, that flows downhill (p. 12)

sandbar a long ridge of sand formed in a body of water by currents or tides (p. 16)

sediment particles of dirt and rock that are carried by water, wind, or ice and deposited elsewhere(p. 16)

surface water water found above ground, on land (p. 12)

water cycle the path water takes, and the changes it goes through, as it cycles through the environment (p. 6)

water molecules a small particle of water, made up of hydrogen and oxygen (p. 7)

watershed the area of land that catches rain and snowmelt when it flows as runoff (p. 12)

water vapor the gaseous state of water (p. 6)

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The Water Cycle

A Science A–Z Earth Series

Word Count: 1863

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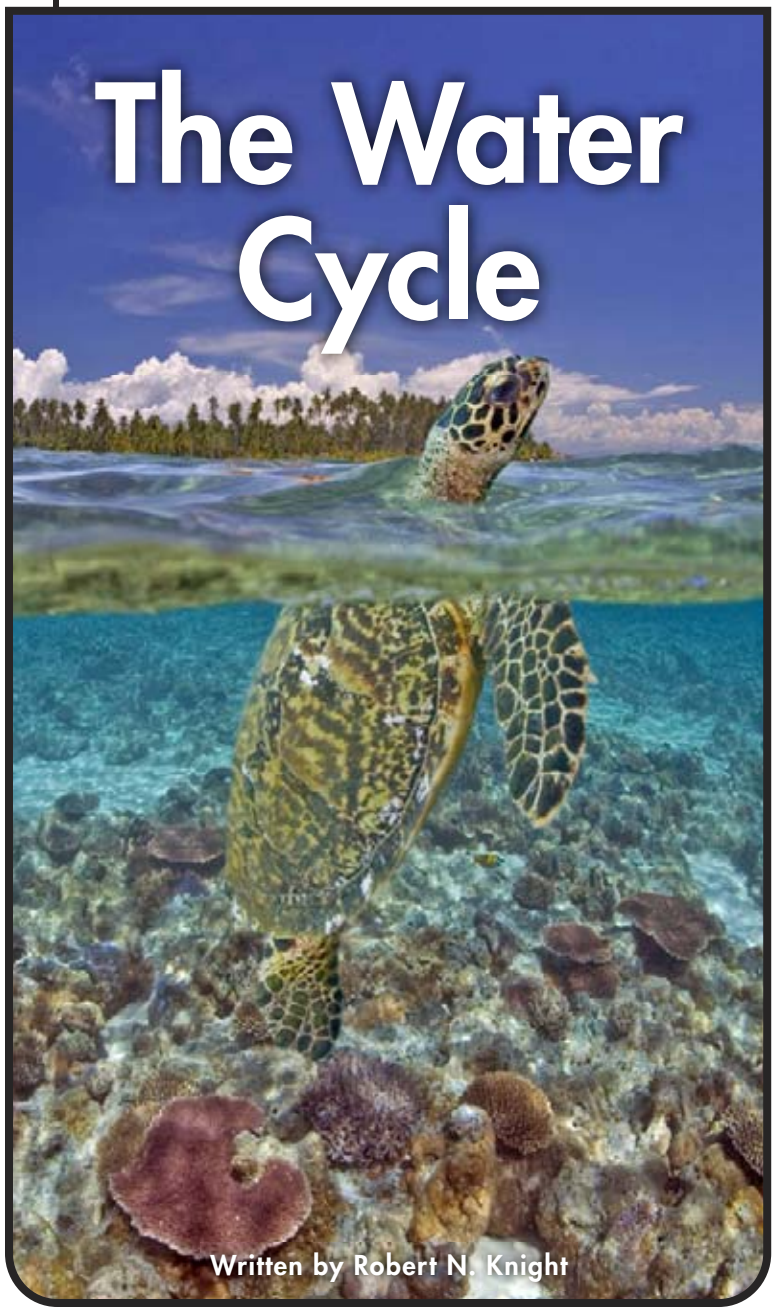

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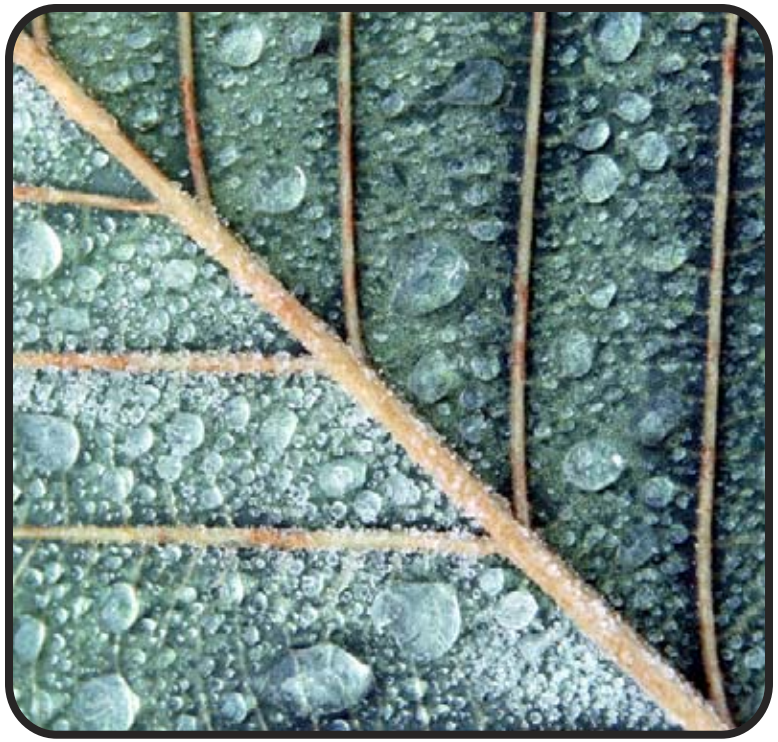
The Water Cycle



Written by Robert N. Knight

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KEY ELEMENTS USED IN THIS BOOK
The Big Idea: Understanding the water cycle is crucial to understanding how what we do—polluting, farming, damming, using, wasting, conserving—affects everyone's water.
Key words: absorb, aquifer, cloud, condensation, conservation, cycle, dam, delta, deposition, drought, Earth, energy, erosion, evaporation, flow, freeze, fresh water, gas, glacier, groundwater, hail, ice, irrigation, lake, liquid, melt, ocean, polar caps, pollution, precipitation, rain, river, runoff, salt water, sandbar, sediment, sleet, snow, soil, solid, state of matter, stream, surface water, temperature, thunderstorm, water, water cycle, water molecule, watershed, water vapor, weather, well **Key comprehension skill:** Cause and effect *Other suitable comprehension skills:* Sequence events, Main idea and details, Interpret charts, graphs, and diagrams, Author's purpose **Key reading strategy:** Summarize *Other suitable reading strategies:* Visualize, Connect the text to prior knowledge, Retell, Ask and answer questions

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Written by Robert N. Knight

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Cirrus clouds

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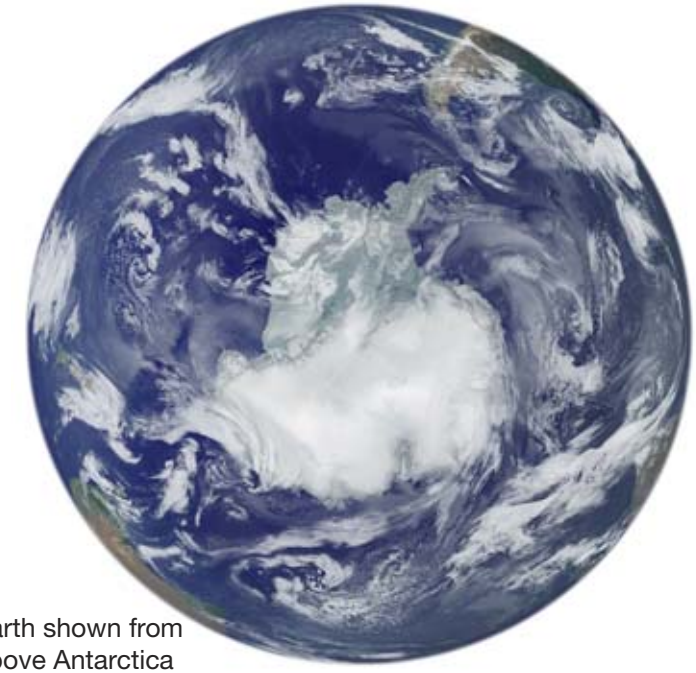
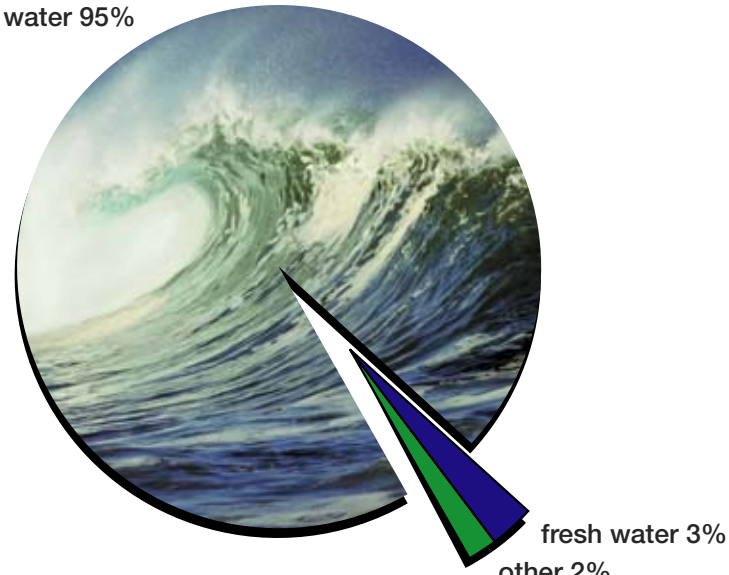
Introduction: Water Everywhere

People call Earth the water planet because water covers three-fourths of its surface. We have lots of water, but most of it we can't use. The world population is growing, and as it grows, more people compete for this supply of water. Also, as we pollute more of our water supply, the water we need is getting scarcer.

This book explores how the Earth's water moves from place to place. It describes the changes water undergoes as it moves. It also describes how we use water and what we can do to conserve and protect it.



Earth shown from above Antarctica



Water on Earth

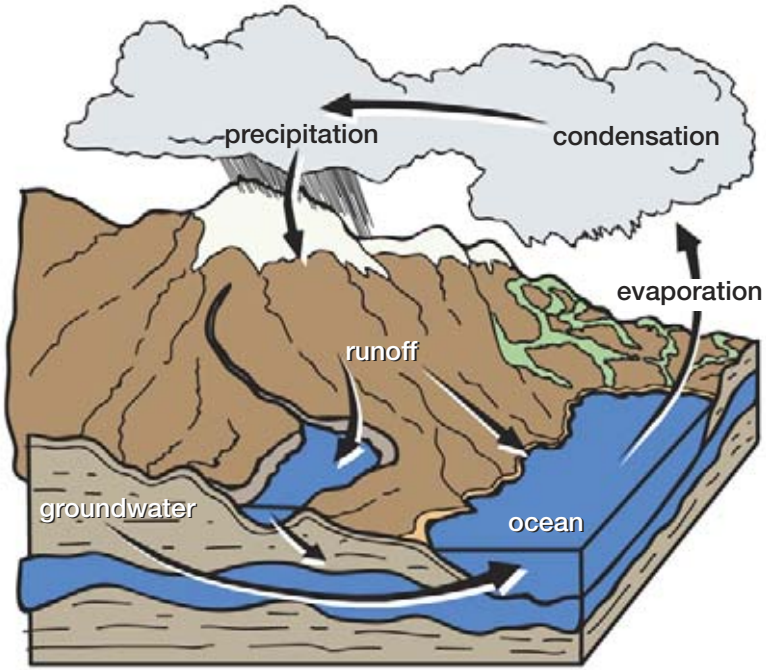
About 95% of Earth's water is contained in the oceans that cover most of the planet's surface. Ocean water contains many kinds of minerals. These minerals give ocean water its salty taste, which is why it is called salt water. Drinking salt water just makes you thirstier. People and many animals can get sick or die if they drink too much salt water.

About 3% of Earth's water is fresh water. Lakes, rivers, and streams all contain fresh water that comes from rain and melted snow. Fresh water also exists underground. But most of Earth's fresh water is contained in glaciers found in mountains, icebergs, and ice sheets, found around the North and South Poles.

The Movement of Water

Matter is found in three states: liquid, solid, and gas. We are used to seeing Earth's water in its liquid state. Water also exists in its solid state as ice and in its gas state as invisible **water vapor**.

Earth's water often changes from one state of matter to another as it moves from place to place. The changes and movement of Earth's water are all part of the **water cycle**. The water cycle has been going on for billions of years, moving Earth's water from the oceans to land and back to the oceans.



Water evaporates into the air, forms clouds, and precipitates down. On the ground, water flows downhill until it meets the ocean.

Evaporation and condensation

Energy from the Sun powers the water cycle. This energy helps water change from one state to another.

The water cycle begins with **evaporation**. During evaporation, liquid water changes into water vapor. Heat and light from the Sun hit Earth's water in oceans, rivers, lakes, and even the smallest puddles. The tiny particles, called **water molecules**, that make up water, absorb this energy. As they gain more and more energy, the molecules move faster and faster and begin to spread apart. Soon they absorb enough energy to escape Earth's surface water and enter the air as water vapor.

When water vapor in the air rises into the atmosphere, it begins to cool. Water molecules begin to collect on dust particles floating in the air. They gather to form tiny water droplets. This process, called **condensation,** happens whenever water changes from a gas back to a liquid. This is the next step in the water cycle.

As more and more water vapor condenses, the droplets start to form clouds. As more droplets form, the clouds get thicker and darker.

You can tell a lot about what weather might be coming by looking at clouds. High, wispy clouds mean there is ice and moisture above, and the weather may be changing. Fluffy, spread-out clouds may mean there is a little water above, but not enough for rain. Very tall clouds with dark bottoms usually mean that a thunderstorm with heavy rain is coming.

Yosemite Valley on a clear and a cloudy day

Word Wise

There are many types of clouds, each with its own name. Cloud names come from words from the Latin language. Part of the word may describe the height of a cloud. *Cirro* means "high," and *alto* means "mid-level." Another part of the word may describe a cloud's shape. *Cirrus* means "feathery" or "curly," *stratus* means "layered," and *cumulus* means "fluffy" and "pillow-like." A cloud with *nimbo* in its name produces precipitation.

Here are some cloud names made from Latin words.

Cumulonimbus:
large fluffy rain clouds

Nimbostratus:
thick layers of rain clouds

Altocumulus:
mid-level fluffy clouds

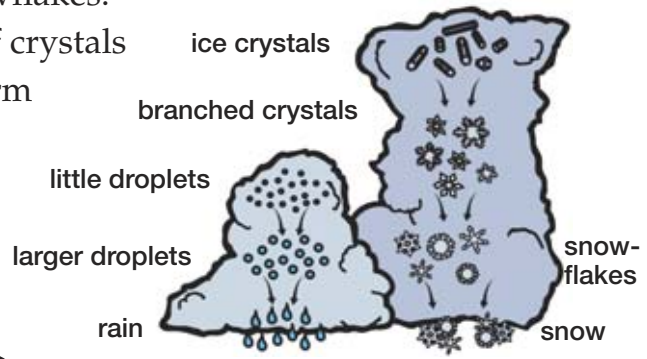
Cirrostratus:
high layered clouds

Cirrus:
feathery clouds

Precipitation

Rain, snow, sleet, and hail are different kinds of **precipitation**. The temperature inside a cloud determines what kind of precipitation will fall.

When the air in a cloud cools, the water droplets come closer together. Small droplets join to make larger drops. If the temperature inside the cloud is above freezing, raindrops form. If the temperature is below freezing, the water droplets freeze into tiny crystals of ice. These ice crystals come together to form snowflakes. When lots of crystals join, they form snowflakes that fall to the ground.



Conditions for rain and snow inside a cloud

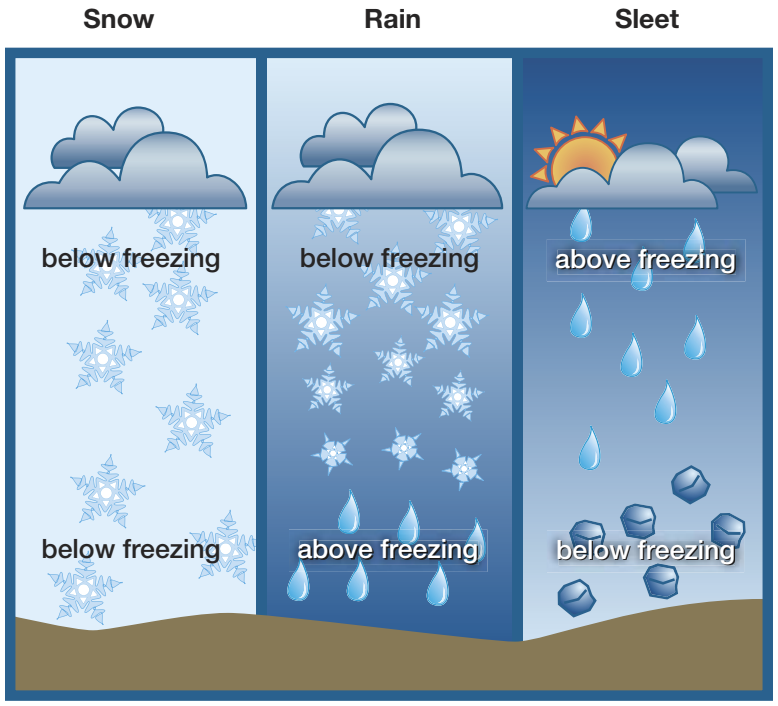
Do You Know?

Hailstones are a special type of precipitation. Hailstones are balls of ice that form when wind blows raindrops up to the top levels of a cloud. The raindrops freeze in these colder, higher parts. As they fall back down through the cloud, more water droplets gather on the hailstones. A strong wind blows the hailstones back up, and another layer of ice forms. This happens again and again. Finally, the hailstones get so heavy they fall to the ground.

The temperature of the air between a cloud and the ground also has an effect on the type of precipitation that falls to Earth.

Precipitation may start as snow and melt on the way down, if the temperature is above freezing. If it is colder below a cloud than within the cloud, the falling rain refreezes as it falls, producing sleet or freezing rain.

Freezing rain sometimes coats objects on the ground with ice that is over an inch thick. We call this an ice storm



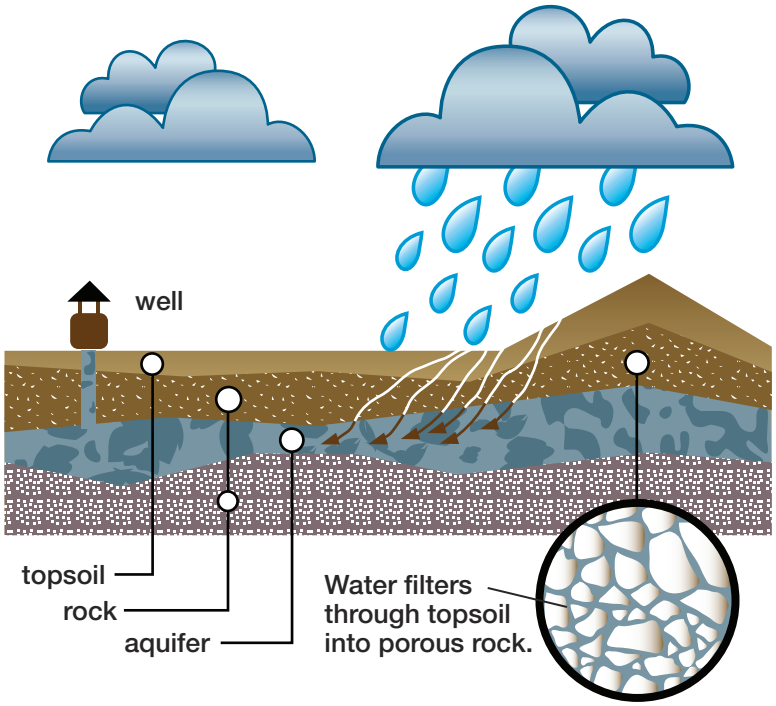
The air temperature in and below the cloud, and above the ground, affects precipitation.

Water on the Ground

When precipitation reaches the ground, it usually runs along the surface, or soaks into the ground. Water running on top of the ground is called **surface water**. It flows downhill under the influence of gravity, a force that pulls everything down to Earth. Some surface water enters streams and rivers as **runoff**. Smaller streams and rivers flow into larger rivers. These larger rivers empty into large bodies of water, such as lakes and oceans. The rivers and streams, together with the land that surrounds them, are called a **watershed**.

Water that soaks into the Earth is known as **groundwater**. Groundwater collects in the tiny spaces between particles of soil and in layers of porous rock. These underground reservoirs of water are known as **aquifers**.

Aerial view of water running off land into streams



Groundwater supplies us with much of the fresh water we need. People drill deep wells into aquifers and pump the water out for drinking. However, if people use the water faster than it can be replaced by the water cycle, the well goes dry.

People can pollute groundwater. Sometimes harmful chemicals are buried in or dumped on the ground. These chemicals can mix with rain soaking into the ground and seeping into wells and aquifers. It is almost impossible to remove pollution once it has entered an aquifer. Pollution in groundwater reduces Earth's supply of fresh water.

Erosion

Surface water can move with a force strong enough to wear away rock and soil. We call this process **erosion**. The faster water moves, the more powerful its force. During heavy rain, fast-moving runoff can remove huge amounts of rock and soil and dump it into streams and rivers.

Farmers and foresters are very concerned about erosion. Good crops need rich, thick topsoil. In nature, forests or thick beds of grass cover the dirt in rainy areas. They help absorb water. When farmers remove the natural plants to plant crops, much of the soil is left bare. Heavy rains wash this exposed soil into the rivers. Planting trees and plants helps keep soil in place.

Erosion cuts away rock and soil.

WOWSER!

The Grand Canyon is over 1.6 kilometers (one mile) deep and up to 30 kilometers (18 miles) wide. That's a lot of erosion!

Grand Canyon, Arizona

The Grand Canyon is a very deep canyon. It took many millions of years to create the layers of rock in the Grand Canyon. But the fast-moving waters of the Colorado River cut through those layers of soft rock, gouging out the canyon in only one million years. The river and other runoff are still cutting the canyon today. Rivers have eroded rock and soil to form canyons and valleys all over the world.

Deposition

Streams and rivers carry eroded sand and soil downstream. These particles of sand and soil are called **sediment**. When a stream or river slows down or comes to a stop, it drops the sediment. This process is called **deposition**.

When rivers make turns or bends as they flow toward the ocean, the water slows down along the inner edge of the turn. Sediments settle out of this slower moving water and form **sandbars**.

When a river finally reaches a large lake or ocean, it slows down and the sediment it is carrying settles out of the water. The sediment gradually builds up, forming new land called a **delta**. As more and more sediment builds up, the delta emerges and grows. Thousands of years of deposition can build many square miles of delta where a river empties into the ocean. The Nile Delta provides rich farmland for Egypt.

The Nile Delta in Egypt, as seen from space (left), and delta farmland (right).

A modern irrigation system

An ancient irrigation system

Controlling Water

For thousands of years, people have known the importance of water. They built their towns and villages near water. They built canals and ditches to force water to go where they needed it. They also built dams and holding ponds to store water and created irrigation systems to bring water to their fields. They knew that a drought could destroy their food crops.

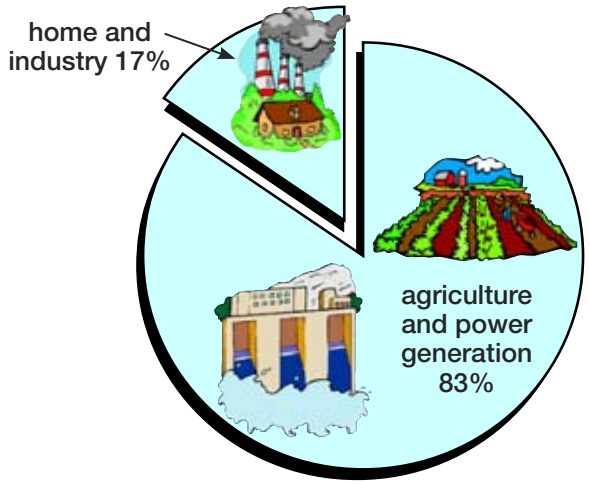
Today, people build dams that are hundreds of feet high. Dams trap water when there is lots of rain. The stored water is then available throughout the year for irrigation. Dams also create electricity, and lakes for recreation. We have placed large pipes into the ground to carry water hundreds of miles. We have irrigation systems that deliver water to crops hundreds of miles from the river. Today, farmers even use irrigation systems to turn desert into farmland.

After people have used water in homes and buildings, we send it to sewage treatment plants. These plants clean the water and return it to the water cycle.

Glen Canyon Dam at Lake Powell in Arizona

WOWSER!

The human body is almost 70% water. There wouldn't be much of you left, if the water evaporated.



Water Uses

The polar caps and glaciers hold four-fifths of the world's freshwater as ice. Only 1 percent of the Earth's water is available for plants, animals, and humans.

The United States uses 40% of its fresh water to irrigate food crops. Industry and households share what remains. Power plants and other factories use water for cooling. That water evaporates to become part of the water cycle again. Some industries use water for cleaning or production and then release it back into the water cycle.

At home, people use water for drinking, bathing, and watering their gardens. In some parts of the world, clean drinking water is hard to find. Fresh water may become an even more valuable resource in the future.

Water Conservation

Where will our future fresh water come from? Some countries are digging deeper wells to find more water. Some towns are building plants to make fresh water from salt water.

Scientists are discovering ways to conserve water. For example, new toilets use about half as much water as they did 20 years ago. Drip irrigation systems deliver water directly to plants.

People can learn that there is a very limited supply of fresh water. They can learn how to conserve water, and stop waste.

A plant that removes salt from salt water.

Things you can do to save water:

- Turn off the water when you're not using it.
- Don't run water when you brush your teeth.
- Take shorter showers.
- Fix leaking faucets.
- Wash dishes and clothes only when there is a full load.
- Collect rainwater for plants.
- Water the lawn in the evening.
- Put lawn sprinklers on timers.
- Install drip systems.

Conclusion

In addition to air, water is one of our most important resources. Without it, living things could not survive.

Earth would be a dry and barren planet if there were no water. The landscape would look much different. There would be no oceans, lakes, or rivers. There would be no canyons or valleys.

Water moves constantly through the air, over the land, and under the land. As it does, it changes states between liquid, solid, and gas. This water cycle gives us rain, snow, and the water we drink. Since we can only use a small part of the water on Earth, it is very important that people use water thoughtfully. We cannot afford to waste or pollute this precious resource.

The quality of the water affects every living thing on Earth.

Glossary

aquifer an underground layer of rock, sand, or other material through which groundwater flows (p. 12)

condensation the process by which water changes from a gas to a liquid state (p. 8)

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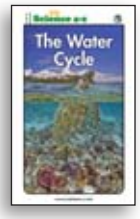
WATER

The Water Cycle

INTRODUCTION



This book is available in three reading levels, as indicated by the one, two, or three dots beside the Science A–Z logo on the front cover.

This guide offers general instructions that can be used with any or all of the leveled books. When appropriate, tips are provided for modifying the instruction for a specific level. The dots in this guide indicate elements of the instruction that are only applicable to certain book levels.

- • can only be used with low level
- ⋮ can only be used with middle level
- ⋮ can only be used with high level
- •⋮ can be used with low and middle levels
- ⋮⋮ can be used with middle and high levels
- •⋮⋮ can be used with all three levels

Throughout the unit, places to refer back to the unit spark (see *Unit Guide*) are identified with this symbol: ✳

BOOK SUMMARY

The book *The Water Cycle* traces the movement of water through the water cycle and covers the changes water undergoes. It also discusses the effects of water movement, changes it causes on land, and the effects of weather. Labeled photographs and diagrams support the text.

Preview the book title, cover, and table of contents with students. Ask them to predict what the book will be about. Invite students to preview the remainder of the book, looking at pictures and captions, as well as special features, section heads, and the glossary. Encourage them to use this information to continually make and revise their predictions while reading.

Vocabulary

Instruction for the unit's vocabulary terms can be found in the *Unit Guide*. It defines core and other science terms, and offers links to puzzles and worksheets you can use to teach vocabulary before, during, or after the reading.

These terms are found in the glossary. Certain terms are only found in certain book levels, as noted.

aquifer ⋮⋮	**condense/condensation**	**delta**
deposition	**erosion**	**evaporation**

groundwater	**precipitation**	**runoff**
sandbar	**sediment**	**surface water**
water cycle	**water molecule**	**watershed**
water vapor		

Reading Strategy

Summarize

Explain to students that one way to understand and remember information in a book is to write a summary, or a brief overview of the most important information in the text. Point out that a summary includes the main idea and one or two supporting details.

Model writing a summary of page 5 on the board.

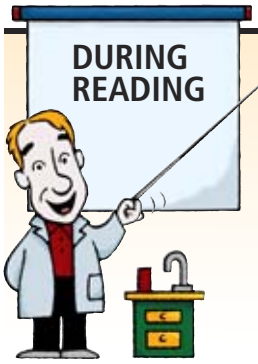
> **Think-aloud:** *To summarize, I decide which information is most important to the meaning of each section. To do this, I can identify the main idea and important details, and then organize that information into a few sentences. When I look at the main idea and details on the board, a summary of this section might be: Most of Earth's water is salt water that is found in oceans. The rest is fresh water that is found on or below the ground, as groundwater, liquid water, or ice.*

Write the summary of page 5 on the board. Have students identify the main idea and details within the summary. Discuss how you used your own words to create the summary.

As the book is read, instruct students to pause at the end of sections to summarize in their own words what they have read. This may be performed orally or in a science journal. Encourage them to focus on the important points, and then support these with details. Checking back with the text helps with retention and clears up confusion.

Download and print the *Summarize* graphic organizer.

TIP The graphic organizer can also be used with each of the *Quick Reads*.



The book begins with an introduction to Earth's water, and previews the topics to be addressed later in the book. After reading this section, you may want to have students rephrase the explanation to check for understanding. (Retelling)

The most important concepts in this book are that water goes through different stages in its cycle, and that humans can affect all stages of the cycle. Reinforce this for students as they read.

You may want to review the key science terms in each section before students read it. Encourage students to read one section at a time, and then discuss in pairs, groups, or as a class what was read. (See *Discussion Questions*.)

Using tangible models can help explain abstract concepts. Refer to the *Process Activities* for ideas on how to illustrate some of the stages of the water cycle.

You may wish to have students read the special features of the book to build on the concepts within each section. Some vocabulary terms can be reinforced in these features.

Comprehension Skill Focus

Cause and Effect

Describe a cause and effect relationship, such as when water gets cold enough, it turns to ice, and when ice gets warm, it melts and changes to a liquid. Invite students to share examples of familiar cause and effect relationships. Then have small groups of students list examples of cause and effect relationships from the book.

Examples:

- Water rises in the form of water vapor and cools to form clouds. (2 events in the cycle)
- Clouds cool and water droplets slow down and join together. (3 events in the cycle)
- Air cools in a cloud, and water droplets gather together and get heavier. They fall to the ground. (3 events in the cycle)

Download and print the *Cause and Effect* graphic organizer.

TIP The graphic organizer can also be used with each of the *Quick Reads*.

As students read, they should use other comprehension skills in addition to cause and effect.

Discussion Questions

Use the *Discussion Cards* during or after reading. The cards are structured so they can be used for whole-group discussion, or assigned to individuals, pairs, or groups. Choose the activity that best serves your purposes. It may be helpful to allow students to use their books, T-charts, and completed graphic organizers as they try to answer the questions. Here are some suggested activities:

- Divide the class into groups and have each group discuss the questions from a section of the book. Then have groups report their responses to the class.
- Place discussion cards at centers and have groups talk about or write their responses as they rotate through them.
- Have each student choose a card and write an answer on the back. Collect and review these with the whole class.

- Assign certain questions to groups or individuals for homework.

Each question can be answered with certain book levels, as noted with dots in the upper left corner. You may want all students to think about all the questions, even if their book level is not noted on certain cards. The book section or topic most closely related to the question appears on each card. Question types are noted in parentheses.

All questions can be answered with all three book levels, except where noted.

Introduction

- Where is most of Earth's water found? (knowledge)
- How is salt water different from fresh water? (comprehension)
- What are two ways in which Earth's water supply is being threatened? (knowledge)

The Movement of Water

- What are the different forms of water found on Earth? (knowledge)
- Explain what the water cycle is. (comprehension)
- What happens when water evaporates? (comprehension)
- Explain what has happened when water condenses on the inside of a house window. (application)
- Explain why clouds can look different. (comprehension)

Precipitation

- What has to happen before a cloud can produce rain? (comprehension)
- How do conditions differ between raining and snowing? (comprehension)
- Describe the conditions necessary to produce sleet. (knowledge)

Water on the Ground

- What can happen to water that falls to the ground as precipitation? (knowledge)
- Explain what a watershed is. (comprehension)
- Why is it dangerous to dump chemical pollutants on the ground or to bury them in the ground? (knowledge)

Erosion

- What is erosion? (knowledge)
- How can people prevent erosion that is caused by water? (comprehension)
- What are some examples of erosion in your area? (application)

Deposition

- What causes sediment to get deposited? (comprehension)
- Describe two landforms that can form when river sediment is deposited. (knowledge)

Controlling Water

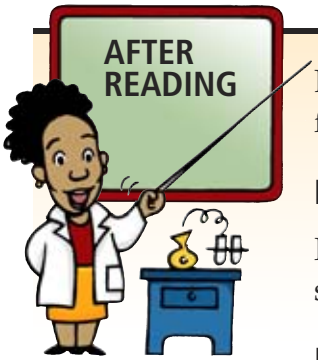
- Name two reasons why humans build dams? (knowledge)
- What is one negative effect of building a dam? (evaluation)

Water Uses

- Cite at least five ways humans use water. (comprehension)

Water Conservation

- Why is it important to conserve water? (analysis)
- What are some ways that we can save water? (knowledge)



Encourage students to reread the book for reinforcement of the content and for reading fluency.

Reflect on the Reading Strategy: *Summarize*

Review the strategy of summarizing. Invite students to explain how this strategy helped them understand what they read.

Enduring Understanding

In this book, students have read about water, including how it moves through the water cycle. Discuss the following question with students:

- *Now that you know have learned about how water travels through the water cycle, how will this affect your habits regarding water, and why?*

Home Project

Have students take an inventory of every way water is used in and around their home, from the more obvious (e.g., showering, watering plants, washing cars) to the less obvious (e.g., making ice, evaporative coolers, pet water bowls). Have students share some responses with the class. Students may be surprised to discover the demand for water in their home.

You may also want to request water usage data from household water bills, to conduct a class-wide analysis. Then you might invite students to suggest ways they can reduce their water usage at home.

Assess

Download and print the *Unit Quiz.*

Use the *Nonfiction Retelling Rubric* to assess understanding.

Quick Check: For individual or group assessment, have students respond orally or in writing to the following prompt:

- *Describe the changes a drop of water goes through as it passes through the water cycle.*

Glaciers

Glaciers are slow-moving masses of ice and snow. They form in places where more snow is falling than melting. These conditions are found high in the mountains, and near the North Pole and South Pole.

There are two common types of glaciers: **alpine** or **valley glaciers** and **continental glaciers**. Alpine glaciers can form in high mountains. Continental glaciers form over large areas of land in the polar regions.

Glaciers form where it is always cold. They need snow to grow larger. It is very cold in Antarctica, but it is also very dry. Little snow falls, so glaciers there grow slowly.

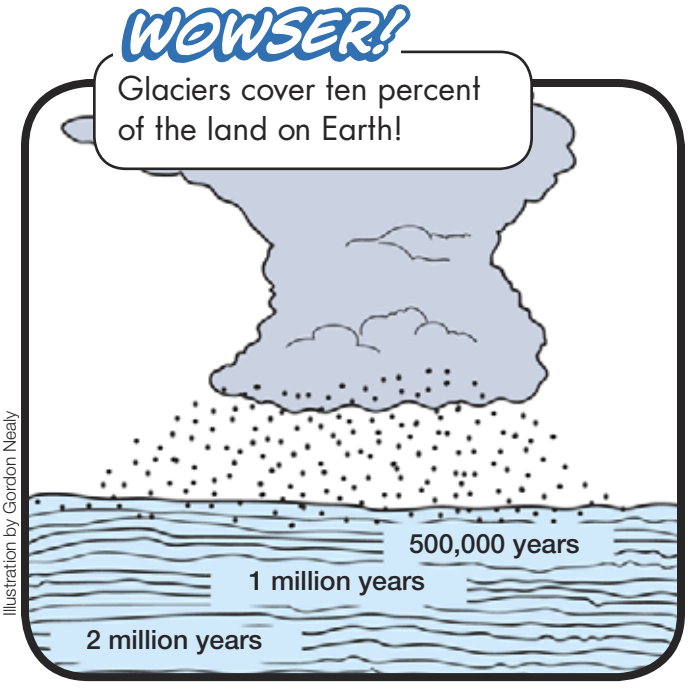


Illustration by Gordon Nealy

Glaciers are layers of snow built up over many years.

© iStockphoto, David Becker

Glaciers are on the move. Snow piles high on top of a glacier. The weight of the snow puts huge pressure on the glacier. Over time, the heavy snow squeezes the lower layers into ice. As the glacier gets heavier, gravity pulls it down the side of the steep mountain, or outward across the continent.

Glaciers can change the land around them. They act like giant bulldozers. Glaciers carve out valleys and shape mountains. They pick up rocks and dirt. Then they drop them off somewhere else as they move.

Brain Check

- ❏ Where do you find glaciers?
- ❏ Why do glaciers move?
- ❏ How do glaciers affect land?

Glaciers

Glaciers are slow-moving masses of ice and snow. They form in places where more snow is falling than melting. These conditions are found high in the mountains, and near the North Pole and South Pole.

There are two common types of glaciers: **alpine** or **valley glaciers** and **continental glaciers**. Alpine glaciers usually form in high mountains. Continental glaciers form over large areas of land in the polar regions.

Glaciers form where it is cold year-round. They need snow to grow larger. It is very cold in Antarctica, but it is also very dry. Little snow falls, so glaciers there grow slowly. Glaciers form and grow more quickly in areas that receive more snowfall.

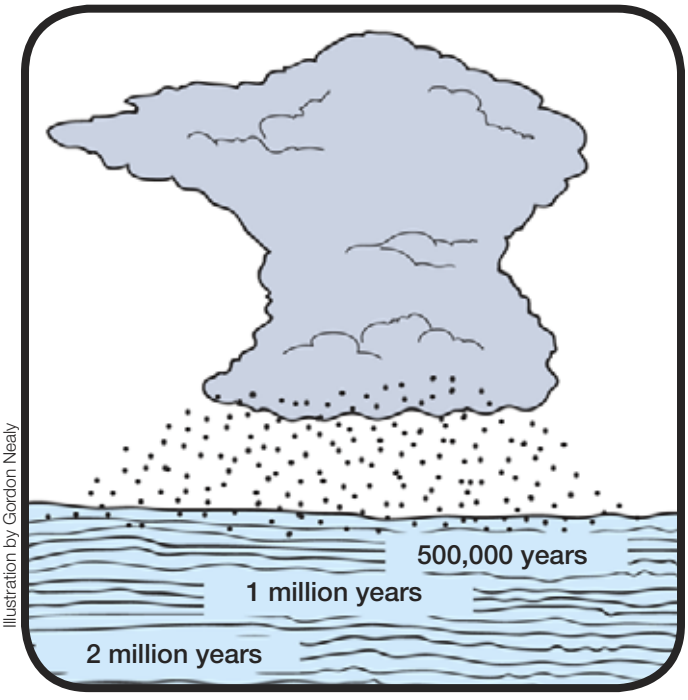


Illustration by Gordon Nealy

Glaciers are layers of snow built up over many years.

Ice breaking off a glacier

WOWSER!

If all the glaciers on Earth were to melt, the oceans would rise by as much as 46 meters (150 feet).

Glaciers are on the move. As snow piles on top of a glacier, the added weight pushes down on the lower layers. The weight of the deeply packed snow squeezes the lower layers into ice. The ice causes the glacier to slide—very slowly—down the side of the steep mountain or outward across the continent.

The movement of glaciers can change the land around them. Glaciers act like giant bulldozers. They carve out valleys and shape mountains. They pick up large amounts of rock and dirt and deposit it along the side or at the end of the glacier.

Brain Check

- ❑ Where do you find glaciers?
- ❑ Why do glaciers move?
- ❑ How do glaciers affect land?

Glaciers

Glaciers are slow moving masses of ice and snow. They form in places where more snow is falling than melting. These conditions are found high in the mountains, and near the North Pole and South Pole.

There are two common types of glaciers: **alpine** or **valley glaciers** and **continental glaciers.** Alpine glaciers typically form in high mountains. Continental glaciers form over large areas of land in the polar regions. The ice sheet that covers Greenland is made up of two large continental glaciers.

Glaciers form where it is cold throughout the year. They form and grow more quickly in areas that receive more snowfall. Glaciers in Antarctica grow slowly because they get very little snow in the area of the South Pole.

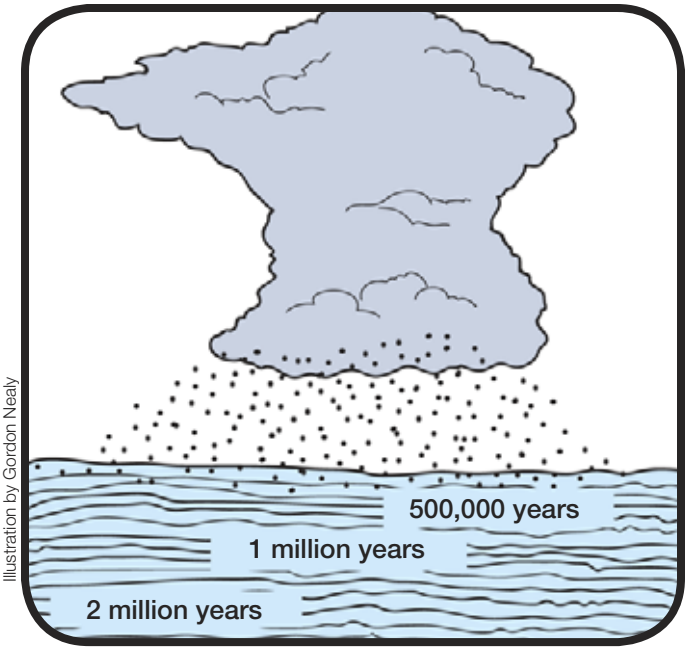


Illustration by Gordon Nealy

Glaciers are layers of snow built up over many years.

WOWSER!

If all the glaciers on Earth were to melt, the oceans would rise by as much as 46 meters (150 feet).

Ice breaking off a glacier

Glaciers move downward and outward under the pressure of their own weight. As snow accumulates on top of a glacier, the added weight pushes down on the lower layers. The weight of the deeply packed snow squeezes the lower layers into ice. As a glacier grows bigger, it begins to slowly move down the side of the steep mountain or outward across the continent.

The movement of glaciers changes the surrounding land. Glaciers act like giant bulldozers carving out valleys and shaping mountains. They pick up large amounts of rock and debris, and deposit it along the side or at the end of the glacier.

Brain Check

- ❏ Where do you find glaciers?
- ❏ Why do glaciers move?
- ❏ How do glaciers affect land?

Water Cycle Model

Purpose
To make a model of the water cycle.

Process Skills
Observe, Measure, Measure, Make a model, Draw conclusions.

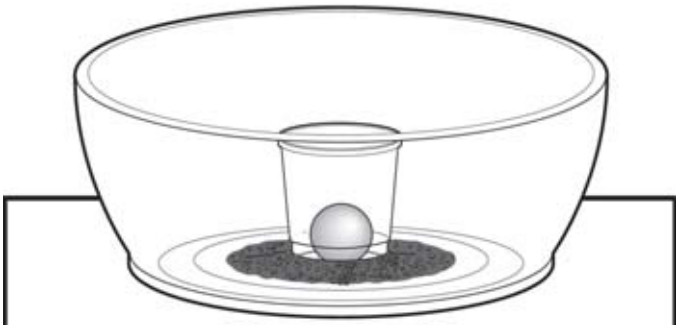
Background
The **water cycle** describes the changes water goes through as it moves from place to place around Earth. The processes of **evaporation** and **condensation** play an important role in the water cycle.

Time – 45 minutes

Grouping – class or groups

Materials
- ❑ large plastic or glass bowl (clear if possible)
- ❑ cling wrap
- ❑ hot water (requires teacher supervision!)
- ❑ large rubber band or masking tape
- ❑ ice cubes (3–5)
- ❑ small plastic cup
- ❑ clear cup or glass
- ❑ marbles, golf balls, or other clean, solid objects (to fit in the plastic cup and hold it down)
- ❑ soil
- ❑ tablespoon

Procedure
1. Place the solid object inside the plastic cup and place the cup in the center of the bowl. Make sure there is about 5 cm. (2 in.) between the top of the cup and the top of the bowl. You may have to use a smaller cup or a bigger bowl for this demonstration to work best.
2. Put 5 Tbsp. of soil in the bowl. Slowly add hot water to the bowl, so it mixes with the soil. Bring the water level to about halfway up the cup.



3. Quickly place the plastic wrap over the bowl and hold it in place with the rubber band or tape.
4. Place the ice cubes on top of the plastic above the cup.
5. Observe what happens inside the bowl. Once the motion of water slows or stops, take off the cover and examine the cup. There should now be water in it. Pour this water into a clear cup to see if it is clear or dirty.
6. If there is time, try changing one thing about the model and see what happens. Consider the amount of water, ice, or soil. Try adding salt to the water. Try other ideas.

Name_____ Date_____

Analyze Data

1. What happens to the water in the bowl? Why?

2. Do you think putting ice above the model made a difference? Why or why not?

3. Did the water in the cup have soil in it? Why do you think it did or did not?

4. Would this model have shown how the water cycle works with no cover on the bowl? Why or why not?

5. Water is often seen on the *outside* of this model. Where could it have come from?

6. Ocean water is *not* hot, yet water evaporates from it. How can this be?

Draw Conclusions (Pick one)

1. How is this model similar to the real water cycle, *and* how is it different?

– OR –

2. Describe the path that one drop of water would travel in this model, starting in the dirt.

Water Cycle Model

TEACHING TIPS

Water is one of Earth's most important resources and covers three-quarters of the Earth's surface. An appreciation for and understanding of Earth's water is important for students as consumers of this critical resource. These process activities explore the water cycle and the changes water undergoes as it moves through this cycle, as well as the effects these changes have on Earth. They also help students explore how what we do affects everyone's water.

SET-UP AND PROCEDURES

- If the model is set up properly, the warm water should evaporate upward and condense again as it cools against the underside of the cling wrap. The ice enhances this effect, and makes the wrap sag in the middle, making it "rain" clean water right into the cup.
- The dirt in the bowl is not required, but helps demonstrate the fact that only water turns to vapor, leaving the dirt particles behind.

MATERIALS

- Heat water in a microwave or on a well-supervised burner.
- Be sure the bowl is made to handle warm-to-hot water.
- A clear bowl is preferable, so students can see the model from the sides.
- Several water activities use sand, soil, and/or pebbles; when feasible, reuse them for the next lab. Spread them out on a broad tray to dry in the classroom overnight or in the sunshine.
- Saran Wrap™ is an example of cling wrap.
- Rocks are not recommended for placing in the cup, because students may confuse dirt that washes off them as having come from the evaporating water in the bowl.

SAFETY

- Do not allow students to drink the water.
- Only adults should handle the heated water.

EXTENSIONS AND VARIATIONS

- *Inquiry Science:* Add salt, sugar, and/or powdered drink mix to the warm water. Check to see whether either transferred to the catch cup (this is one occasion when you may have a student taste the water, at your discretion).
- *Inquiry Science:* Have students help propose ways to add onto the model to show other parts of the water cycle, such as runoff.
- *Research:* Help students investigate how water is distilled, and how ocean water can be made suitable for drinking.
- *Project:* As a class, develop a way to model a well.
- *Variation:* Try using cool tap water, but place the model outside on a warm day to see whether it still works.
- *Variation:* Try more or less ice.

ANSWER KEY AND EXPLANATIONS

Analyze Data

1. What happens to the water in the bowl? Why?

Some of the water in the bowl evaporates because it is heated.

2. Do you think putting ice above the model made a difference? Why or why not?

Yes, it did make a difference. It helped cool the rising water vapor, making condensation occur more quickly. It also helped make the cling wrap sag in the middle, so the condensed water would drip into the cup.

3. Did the water in the cup have soil in it? Why do you think it did or did not?

No it did not, because only the water evaporated and then condensed and dripped into the cup. The soil did not move with the water.

4. Would this model have shown how the water cycle works with no cover on the bowl? Why or why not?

No, it would not have been an accurate model because the water vapor would have escaped, rather than condensing and returning to the bowl.

5. Water is often seen on the *outside* of this model. Where could it have come from?

There may be melted ice on top of the cling wrap. Also, there is water vapor in the air surrounding the model. This vapor may condense onto the outside of the bowl if the model is cooler than the surrounding air.

6. Ocean water is *not* hot, yet water evaporates from it. How can this be?

Water does not have to boil to evaporate. The Sun provides heating energy, which makes water molecules speed up and escape the surface of the liquid, becoming vapor.

Draw Conclusions (Pick one)

1. How is this model similar to the real water cycle, *and* how is it different?

It does model evaporation, condensation, and precipitation. But it does not repeat itself like the real water cycle does. Heat would have to be added to the water in the cup to restart the cycle. The model also does not show runoff, percolation, freezing, melting, and some other ways water returns to the atmosphere such as transpiration and respiration.

– OR –

2. Describe the path that one drop of water would travel in this model, starting in the dirt.

First the water evaporates and becomes water vapor. Then it rises, but gets trapped inside the model by the cling wrap. The ice helps it quickly condense back into liquid water. It drips (precipitates) back into the cup that was placed under the center of the cling wrap.