

PIONEER EDITION

NGPIONEER.ORG

APRIL 2010

NATIONAL GEOGRAPHIC Explorer!



Sea Turtles ²

Water Cycle 10 Thunderstorms 12 Colorado River 18



Turtle Tra

Life isn't easy for green sea turtles. They travel thousands of miles to find food, mates, and a place to lay eggs. Follow a turtle from her nest to the open ocean, and back again.

by Gary Miller



Reading Strategy: As you read this story, think about the ways a green sea turtle changes as it grows. Stop from time to time to sum up what you learn.



Turtles

© ANDY KOSI/ISTOCK.COM

Out from the Sand

A nest lies below a sandy beach in Costa Rica. It holds more than 100 round eggs. A baby green sea turtle may be growing inside each egg. The sand on this beach is warm. That is important. Warm sand means more of the **hatchlings** will be female.

One of the eggs moves. Inside it, a turtle rips at the shell with a sharp point on her beak. It's called a caruncle. It may take more than a day for her to come out of her shell.

Using her **flippers**, she struggles up to the surface. Her nest mates are hatching, too. Before long, all the little turtles push up through the sand.

These baby green sea turtles are racing to reach the sea.

From the Sand to Sea

The little hatchling leaves the nest with the others. She's tiny—no bigger than a walnut. She heads for the sea.

The little turtle is in a race for her life. Crabs and birds snatch up other hatchlings. This one is lucky. She makes it to the water.

The ocean pushes her back. She fights to swim against the waves. Over and over, she dives in and comes up for air. She swims through the first day and night. She does not slow down for two days.



© KEVIN SCHAEFER/ISTOCK

© TRANSLANTINE/ISTOCK



Here, a young sea turtle eats a jellyfish. It also may eat shrimps and sea snails.

© PETE ATKINSON/GETTY IMAGES

To the Open Ocean

At last she reaches the open sea. Her journey through these waters may last several years. No one knows for sure what happens during this time.

She rides the **sea currents**. She may hide in clumps of seaweed. She may find food there, too. Some favorite foods, such as shrimps, small jellyfish, and snails live there.

Danger at Sea

Predators are all around, but the color of the sea turtle's shell protects her. Much of the bottom is white. Hungry sharks have trouble seeing it against the sunlit water. The shell's top is dark. Birds flying above miss it.

Several years pass. The sea turtle grows. Now she is a **juvenile**. It's time for her to swim closer to the coast.

Growing Up Green

The sea turtle makes her way to the east coast of Florida. Her shell is now the size of a dinner plate. It protects her from many predators.

She now munches mostly algae and sea grass. Each day she returns to the same patch of sea grass. She may also slurp up a jellyfish or two. Eating sea grass and algae help her grow. It also gives her a green color. That's why she's called a green sea turtle!

At night, she rests under a safe rock or ledge. While sleeping, she can hold her breath for up to five hours!

Returning Home

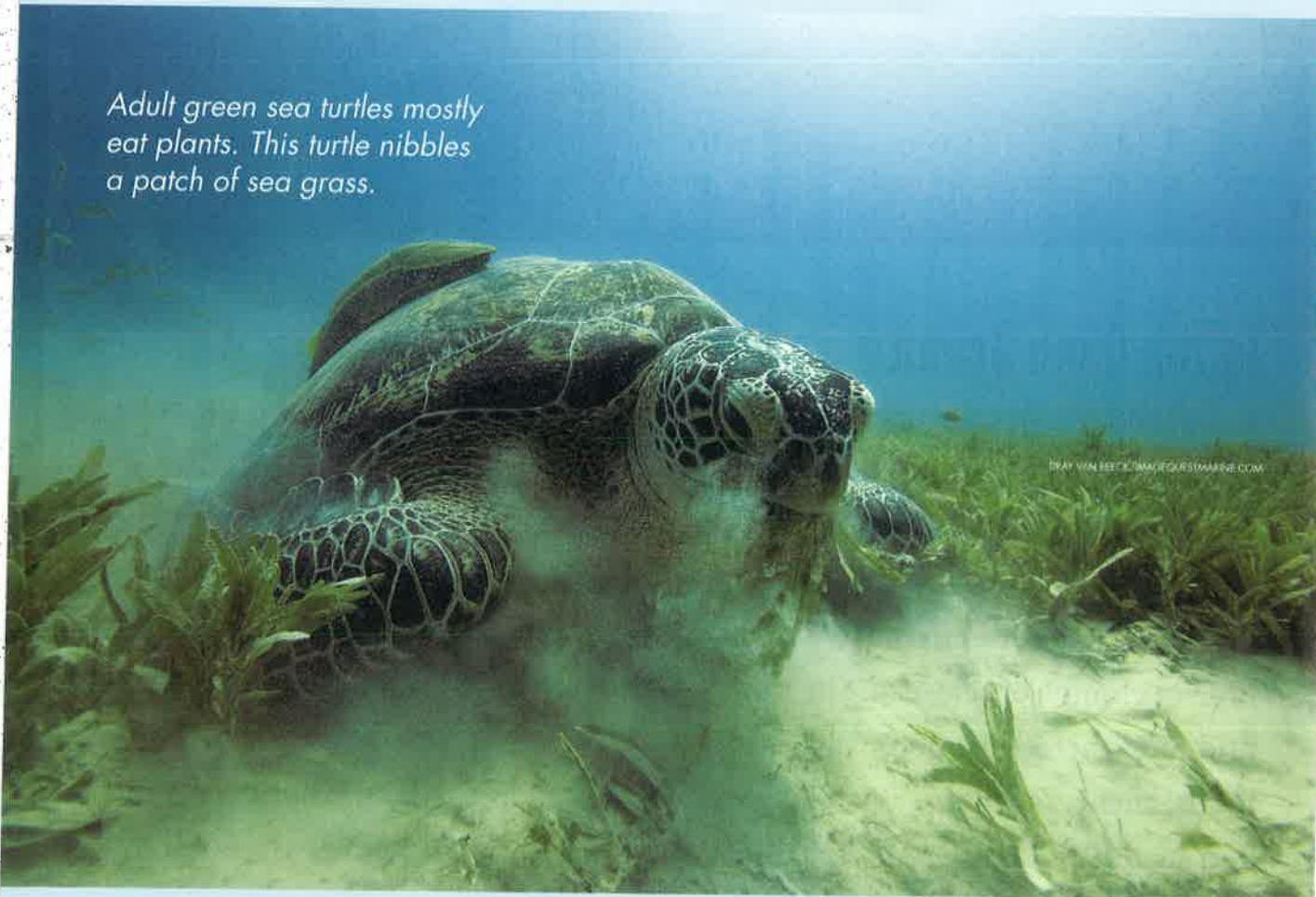
About 30 years go by. The turtle is an adult now. Her shell is slightly longer than an adult's baseball bat. She weighs as much as five third graders.

Soon, she must take another trip. She must return to the place where she was born.

A sea turtle may swim more than 1,000 kilometers (621 miles) to reach the beach where she was born. No one really knows how she finds her way there.

Back at her birthplace, she finds a mate. Then she lays her eggs.

Adult green sea turtles mostly eat plants. This turtle nibbles a patch of sea grass.



*Sea turtles nest on this beach in Costa Rica.
A female turtle born here returns many
years later to lay her eggs.*

© KEVIN SCHAFER/CORBIS

Sea turtle tracks



The Next Generation

The sea turtle pulls her heavy body out of the water. She walks slowly over the sand. She finds a place safe from high tides.

Then using her front flippers, she starts to dig. She tosses sand in the air, digging a wide hole. This will become her nest. Inside the nest, she scoops out a smaller but deeper hole. She is ready to lay her eggs.

She lays more than 100 leathery, white eggs in the smaller hole. She packs sand over the eggs. Then she covers the whole nest with sand.

During the next two months, she will dig and lay eggs in three more nests. After two months, the new hatchlings break out of their shells to begin their own journeys.

Saving Sea Turtles

The young sea turtles will face many dangers, even from people. Luckily, some groups are trying to protect them. One group attaches tracking tags to sea turtles to learn more about these sea creatures. To learn how to follow these turtles, visit www.ngpioneer.org.

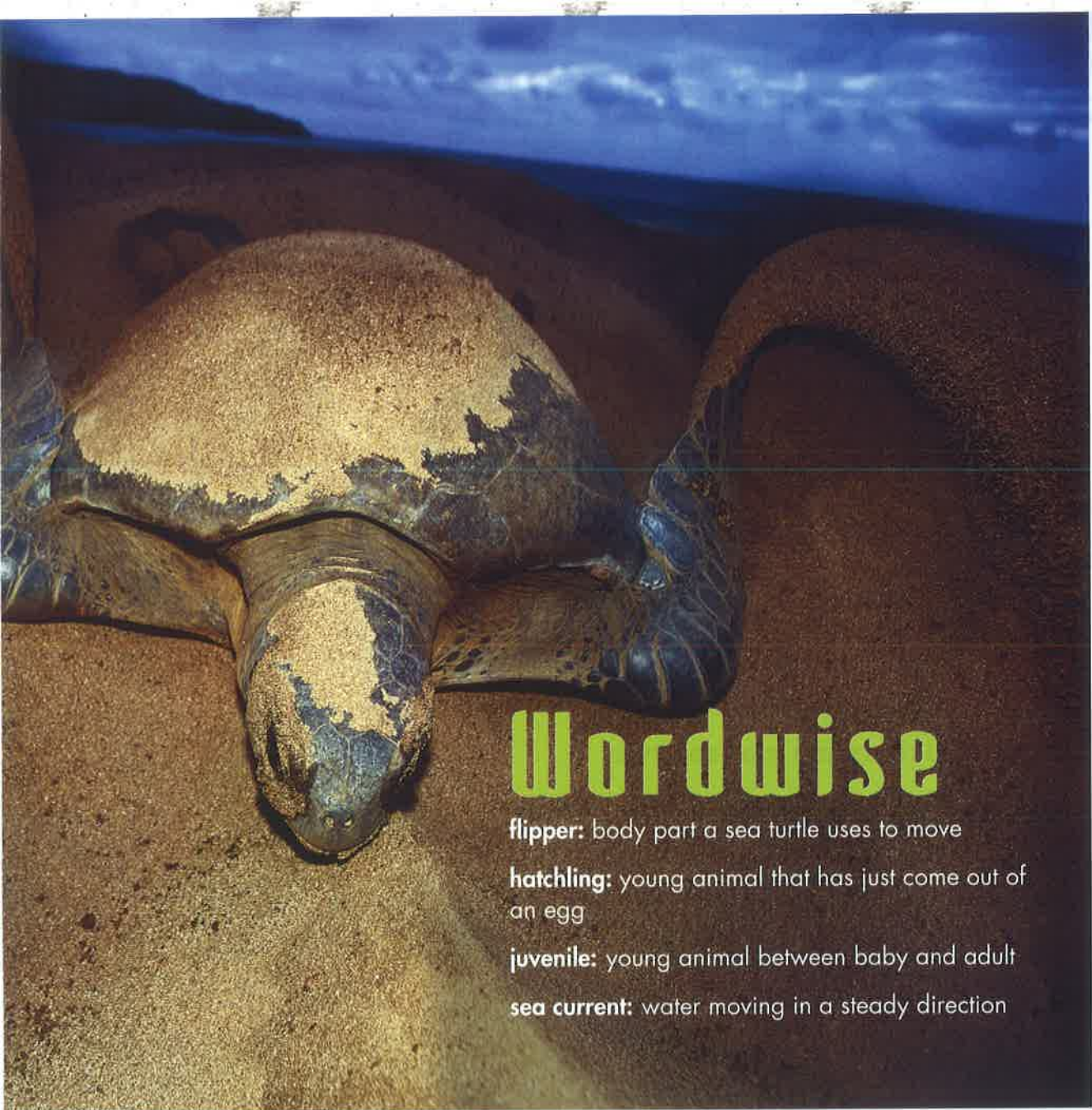


A mother sea turtle uses her powerful flippers to send sand flying.

A green sea turtle lays more than 100 eggs in a nest. Each egg is the size of a golf ball.



© INGRID VISSER/SEAPICS.COM



Wordwise

flipper: body part a sea turtle uses to move

hatchling: young animal that has just come out of an egg

juvenile: young animal between baby and adult

sea current: water moving in a steady direction

© KEVIN SCHAFER/CORBIS

After laying her eggs, this sea turtle goes back to the water. Over the next month, she may return several times to lay more eggs.



© ADRIAN HEPWORTH/NHPA/PHOTOSHOT

© IRINA TISCHENKO/SHUTTERSTOCK

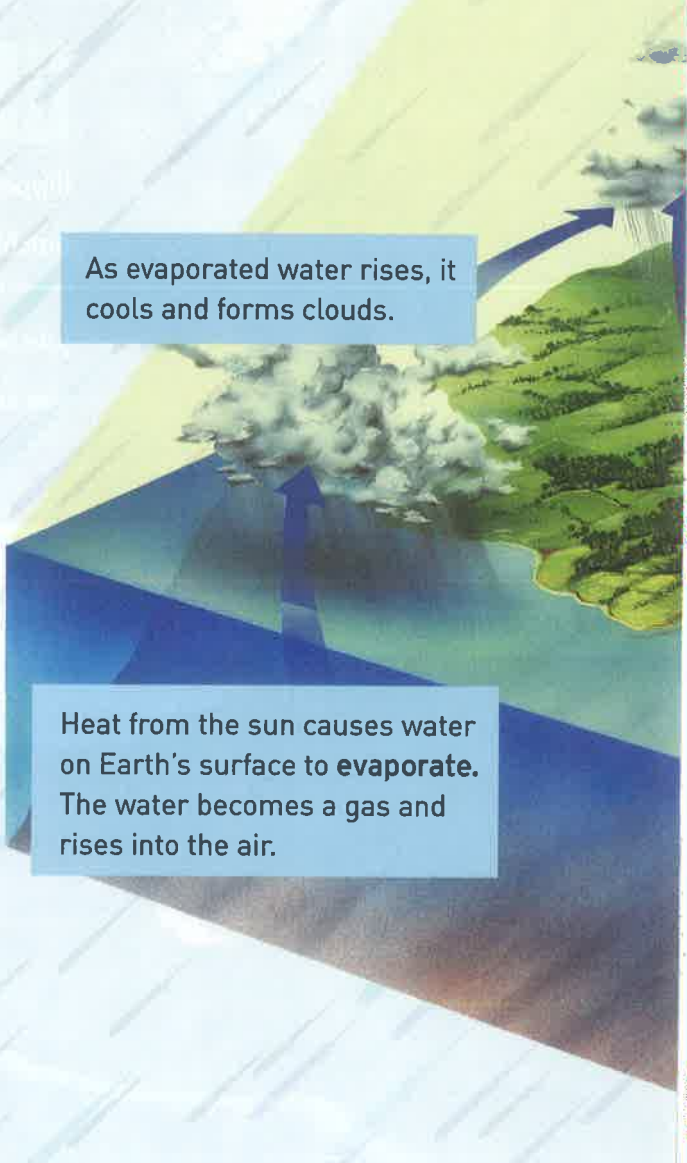
WATER WAYS

© ALEX STAROSEITSEV/SHUTTERSTOCK

Earth's water is always on the move. It travels from the oceans to the sky. It falls from clouds. It flows from streams and rivers into lakes and even the oceans.

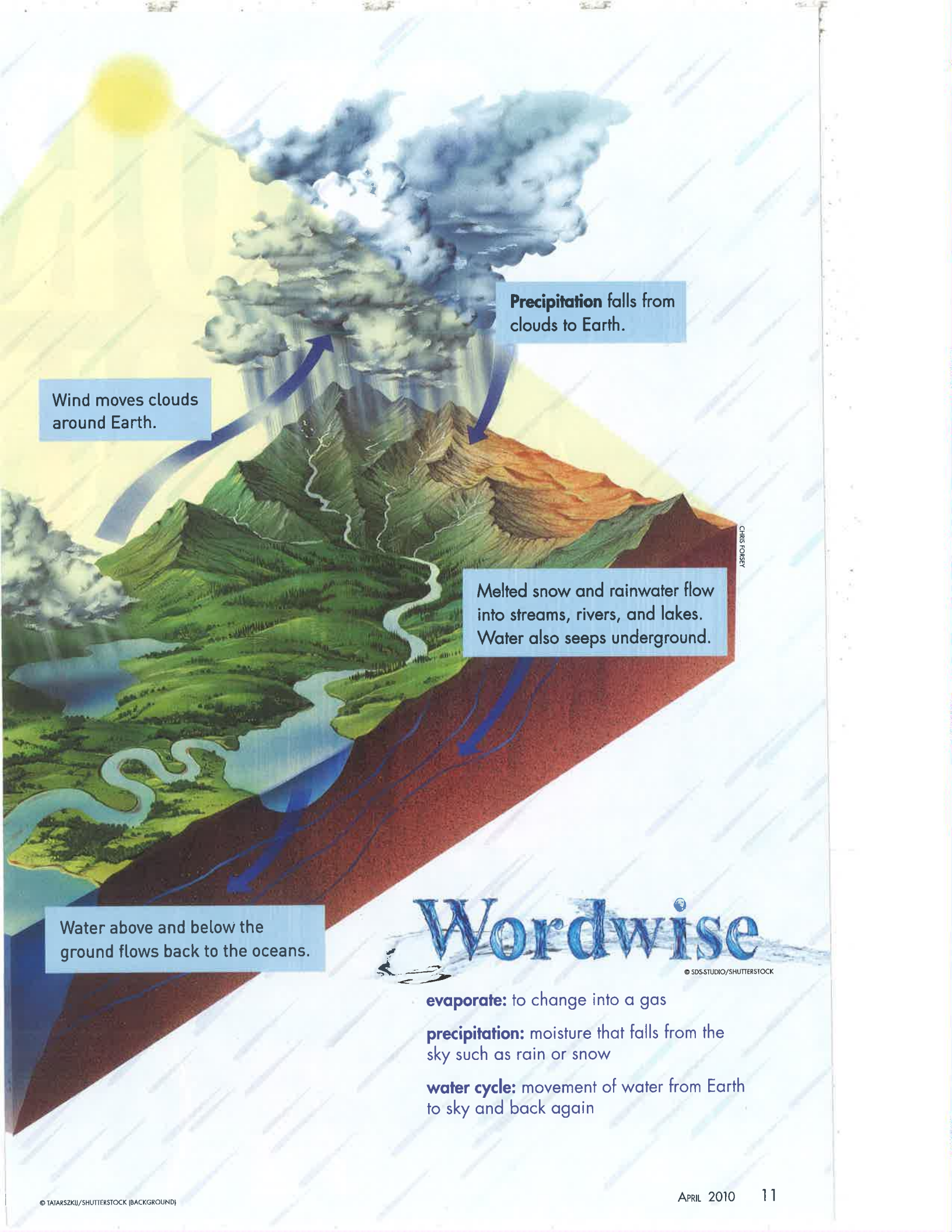
Water's journey goes from Earth to sky and back again. This is the **water cycle**. (See diagram) During this cycle, every drop of water is used, reused, and used again.

Just think. The water now on Earth is all the water we will ever have. There is no more. So it's up to all of us to help take care of it.



As evaporated water rises, it cools and forms clouds.

Heat from the sun causes water on Earth's surface to **evaporate**. The water becomes a gas and rises into the air.



Wind moves clouds around Earth.

Precipitation falls from clouds to Earth.

Melted snow and rainwater flow into streams, rivers, and lakes. Water also seeps underground.

Water above and below the ground flows back to the oceans.

CHRIS FORSEY

Wordwise

© SDS-STUDIO/SHUTTERSTOCK

evaporate: to change into a gas

precipitation: moisture that falls from the sky such as rain or snow

water cycle: movement of water from Earth to sky and back again



Reading Strategy: As you read this story, connect the information to what you already know about storms.

STORM WARNINGS

By Dr. Harold Brooks

Meteorologist, National Severe Storms Laboratory



© HELEN ROBERTSON/ISTOCK

MINING

Huge thunderstorms rumble. Lightning slashes the sky. Winds howl. And deadly tornadoes spin. Welcome to the central United States, the stormiest place on Earth.

I know all about big thunderstorms. I've watched them move through my home state of Oklahoma. One year, eight monster storms hit Oklahoma and Kansas in a single day! The winds tore apart homes. They tossed cars like Frisbees.

These storms killed 40 people. That was bad. Believe it or not, it could have been worse.

I am a **meteorologist**. I work at the National Severe Storms Laboratory. My job is to find out where storms form. I try to predict how dangerous a storm will be. I make **forecasts** that tell when and where bad storms will hit. That can save lives. Join me as I explore some of our most severe storms.

This thunderstorm sent bolts of lightning to Ardmore, Oklahoma.

Birth of a Thunderstorm

A **thunderstorm** always starts with warm, moist air close to the ground. Hills and mountains push this air up into the sky. This air also rises above colder, drier air.

The warm, moist air cools as it rises. The moisture turns into drops of water. These drops cling to small bits of dust in the sky. Lots of drops combined form clouds.

The clouds keep rising. The drops grow larger and heavier. They can fall from the clouds as raindrops. If the tops of the clouds get super cold, the water drops turn into ice. Then they can fall as pieces of ice, or hail.

Light and Sound

Thunderstorms put on a real show. First, lightning streaks through the sky. Lightning can flash inside a storm cloud. It can burst from cloud to cloud. It can strike the ground.

You might have seen spider lightning. It sends branches of crackling light across the sky.

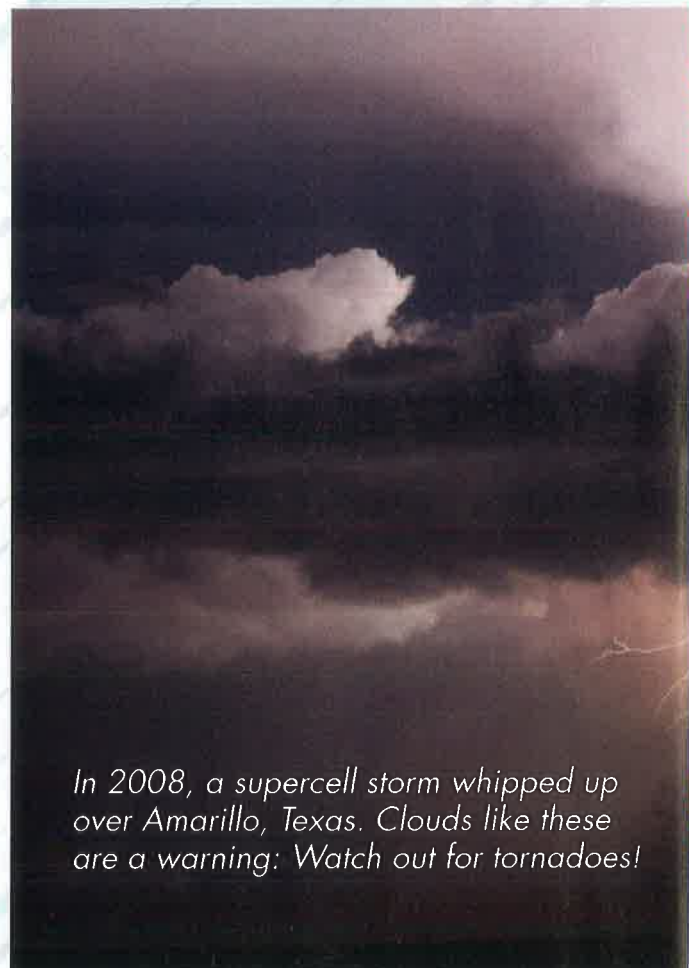
Lightning is hot. It is five times hotter than the surface of the sun. The heat causes the surrounding air to expand. *Boom!* You hear thunder.

Storm Central

A supersize thunderstorm can grow into a severe storm. The storm's wild winds blast at speeds faster than 93 kilometers (58 miles) per hour. Hail as big as golf balls rain down.

Tornadoes can spin off from severe storms. They are spinning funnels of air. When the funnel touches the ground, it's called a tornado.

More bad storms whip through the central United States than anywhere else. Dry, cold air blows east over the Rocky Mountains. Warm, moist air blows north from the Gulf of Mexico. The air mixes to form severe storms.



In 2008, a supercell storm whipped up over Amarillo, Texas. Clouds like these are a warning: Watch out for tornadoes!

Super Storm

The most dangerous severe storm is a supercell. It whips up 282 kilometers (175 miles) per hour winds. That's the speed of a jet taking off! The clouds may stretch 16 kilometers (10 miles) into the sky. That is higher than most jets fly!

During a supercell, blue sky turns black. Wicked winds kick up. Sheets of rain pour down. Huge balls of ice strike the ground.

A supercell may last for hours and can be very dangerous. It can cause bad floods and also super strong tornadoes.

A supercell storm is super bad news. Its water can flood streets, washing away cars. Its winds can blow away houses and other buildings. Watch out when you hear a supercell is on its way.



A severe storm in Kansas dropped hail the size of golf balls.



The Bright Side

Severe storms, tornadoes, and supercells are dangerous. Yet not all storms are bad. In fact, most thunderstorms are good for our planet and for us. Ordinary storms cool Earth. They water crops. They fill lakes with fresh water that you can play in or drink.

Believe it or not, even wind and lightning can be helpful. Winds blow away air pollution, cleaning the air you breathe. Lightning can spark forest fires. This burns away dead wood, keeping forests healthy. Many plants and animals need healthy forests to survive.

Storm Chasers

I use different kinds of equipment to learn about storms. For example, I use weather balloons. These balloons have tools that measure winds.

Radar is another tool. It sends out radio waves. When a wave hits something in the sky, the wave bounces back. We can tell what's happening in the sky by watching how much of a wave bounces back.

I also chase storms. Sometimes I get right next to or even under a storm. Of course, I bring computers and other tools to study each storm. If I see a tornado brewing, I get out of the way fast!

© JIM REED/JIM REED PHOTOGRAPHY - SEVERE &/CORBIS

Storm chasers watch this tornado as it whips up dust and dirt.



Saving Lives

Today, radar scans most of the **atmosphere** above the United States. The radar can spot bad weather even before it forms. As a result, I can warn people about 13 minutes before a tornado strikes. In the past 20 years, the number of people hurt or killed by storms in the United States has been cut almost in half.

Yet I still have questions. Which storms make tornadoes? What happens right before a tornado spins from supercell? Those are just two.

It may take years to answer them. I'm willing to chase more storms to find out!

PHIL SCHERMEISTER/NATIONAL GEOGRAPHIC STOCK



WORDWISE

atmosphere: layers of air that surround Earth

forecast: prediction about weather

meteorologist: scientist who studies weather and what affects it

thunderstorm: rain shower with thunder and lightning

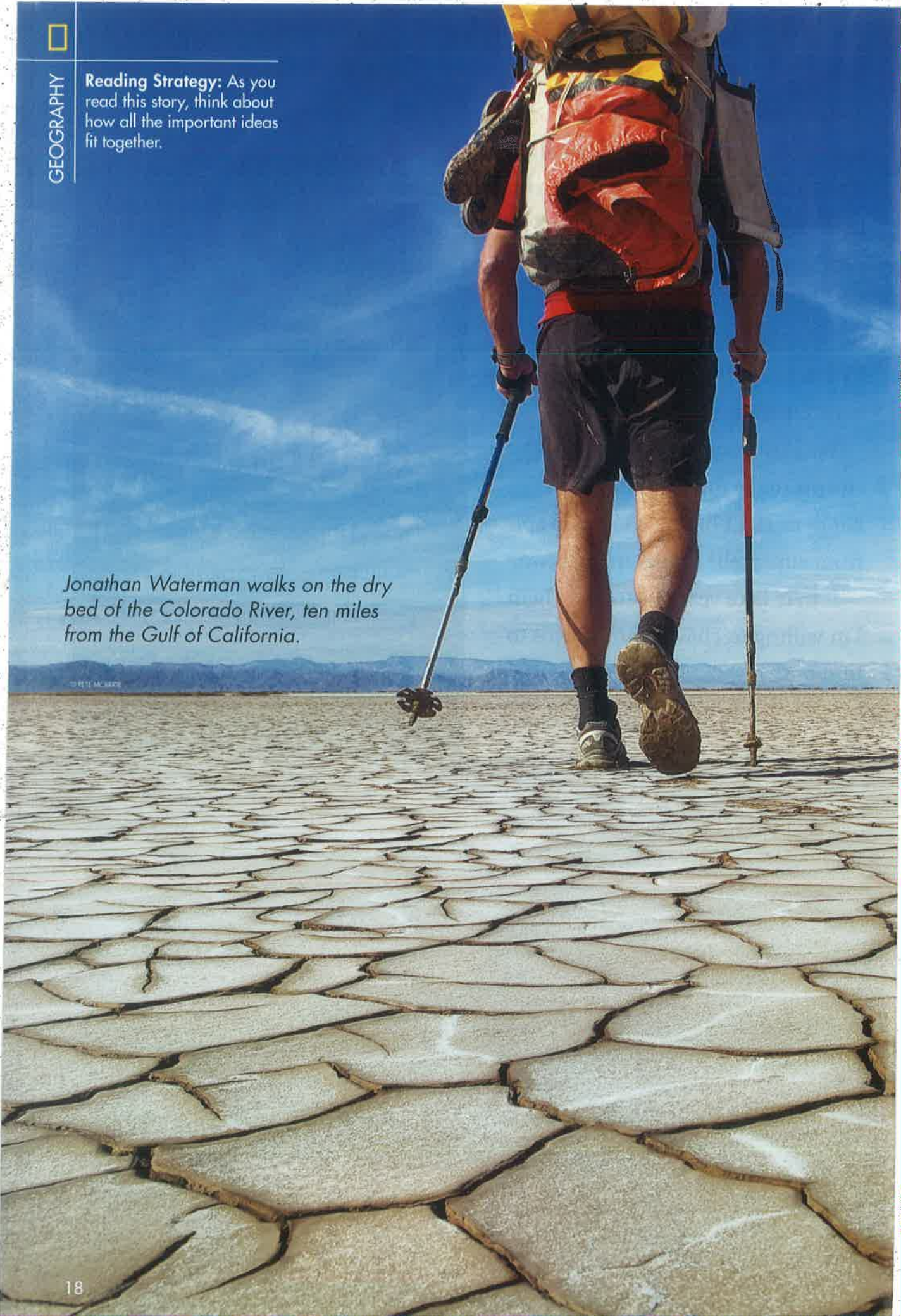
Radar and other tools help forecasters warn people about possible lightning strikes.



Reading Strategy: As you read this story, think about how all the important ideas fit together.

Jonathan Waterman walks on the dry bed of the Colorado River, ten miles from the Gulf of California.

© 2011 NATIONAL GEOGRAPHIC



TROUBLED WATERS

Its powerful waters carved the Grand Canyon. Now the mighty Colorado River is drying up. Ride downstream to follow the twists and turns of this American river.

BY DAPHNE LIU

Jonathan Waterman was hot. Dirt crunched under his feet. He wasn't in a desert. He was standing in the Colorado River, near Mexico. Once, there was rushing water where he walked. Now it was gone.

Waterman was disappointed. He had wanted to paddle down the river, from beginning to end. He started on a raft at one of the river's sources in the Rocky Mountains. Now he was carrying his raft.