

# Science and Living in God's World Grade 6

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*continued*

## Introduction

We continue this year with the *Science and Living in God's World* series. If you have used these science texts in previous years, you know that this series is well-named. The entire series is intended to stress the Catholic belief that God is the Creator of this world in which we live, and that we are the stewards of His world. As stewards, or caretakers, we must use the earth and its resources as Almighty God would want us to use them – in accordance with His Divine Plan.

Each year, the theme – the main idea of the course – varies just a little. You may have been able to identify these themes on your own in past years. For example, we had a theme one year that stressed enjoying God's world. We had another that stressed living in His world. In future years we will have themes in which we see how to learn about and know God's world.

After you have had a chance to read a little of this science book, you will easily see that the theme for this year is *exploring* God's world. From this book, you will learn many things about the earth and the creatures on it. You will also learn about the stars and planets – non-living creatures – in the sky far, far away from the earth. Most of these far-away creatures are many times as large as the earth.

By reading this book, you will become a kind of explorer. An explorer is like a scientist. He reads and studies. He travels and investigates. He thinks. Then he observes and experiments. He tries to discover whether what he thinks is true or untrue.

You will explore the changes that are going on in the earth. The earth was not always as it is now. Some changes were sudden, such as the Great Flood. Other changes have been going on for a very long time. These more gradual changes, which we see as volcanoes and earthquakes, for example, are occurring today, and will most likely continue into the future.

As an explorer-scientist, you will learn that God made laws for all His creatures – man, the animals, the plants, the stars, everything. You will discover that man is the only one of

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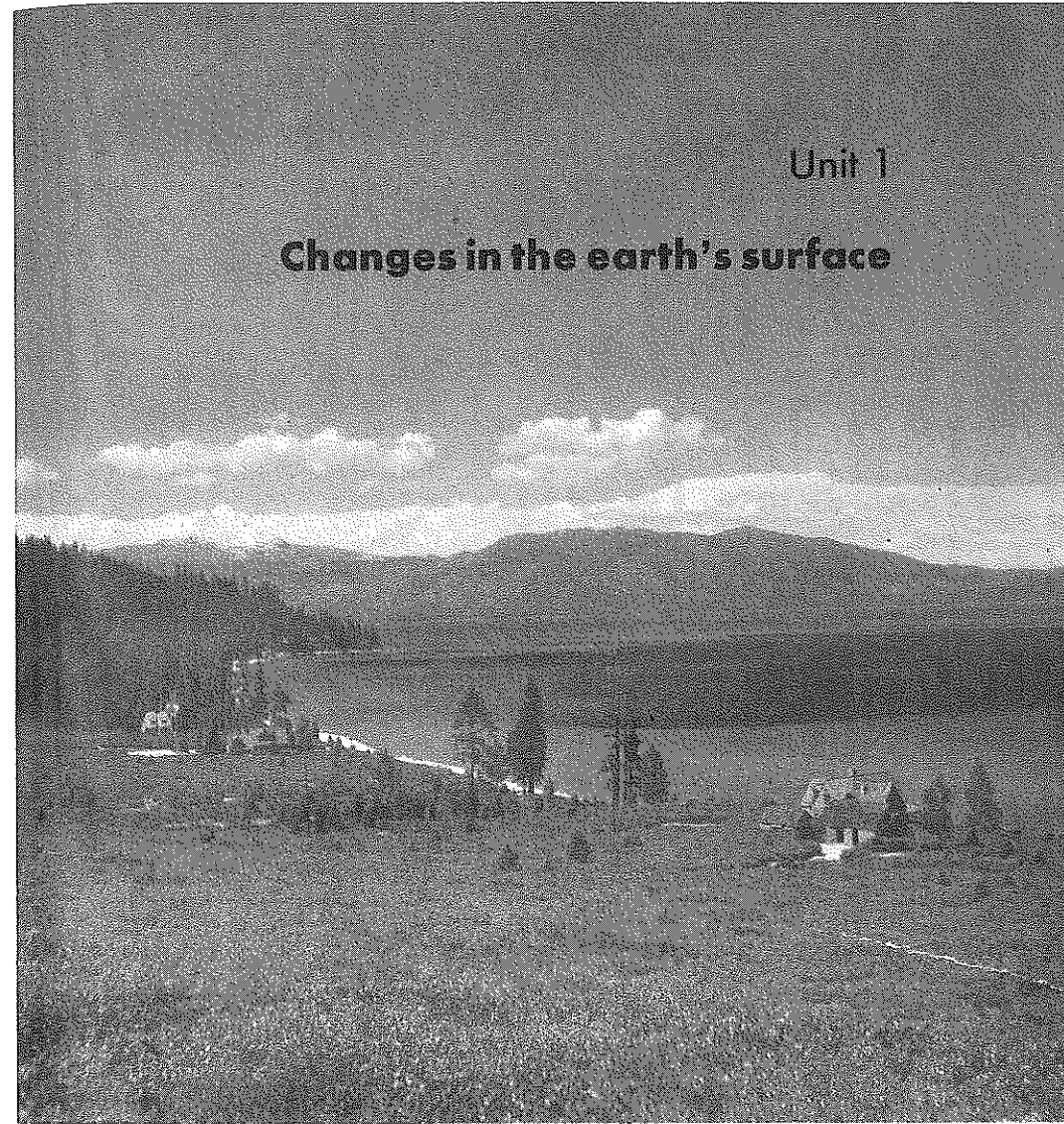
God's creatures who can decide whether he will do or not do what God wants him to do. All other creatures follow the laws that God made for them. The sun rises every morning and sets every evening. It never fails us. The sun is following God's law just as every other creature does every moment of every day. By obeying God's laws, these creatures are following a plan that God made for them.

As an explorer-scientist, you will also learn some of the laws that God made for His creatures. You will learn these laws by observing how creatures do what God wants them to do. These creatures glorify God by following His laws. By learning about them, you may be led along with them to glorify God. You will realize, as Holy Mother Church teaches us, that all things were created *ad maiorem Dei gloriam*, for the greater glory of God.

When you see the great works of an inventor, you admire his skill and his patience. So, when, through this book, you learn about the created works of God, your love and reverence for Him will increase. You will be like the three boys in the Old Testament who sang praises to God. These boys were so grateful for the wonderful things that God had done for them that they could not thank Him enough. So they called on all of God's creatures to help them in praising God. The words that they sang in His praise are the verses on the opening page of each unit in this book. Like these three boys, you will call on the sun, the moon, the plants, the animals, and all the other creatures to bless God with you.

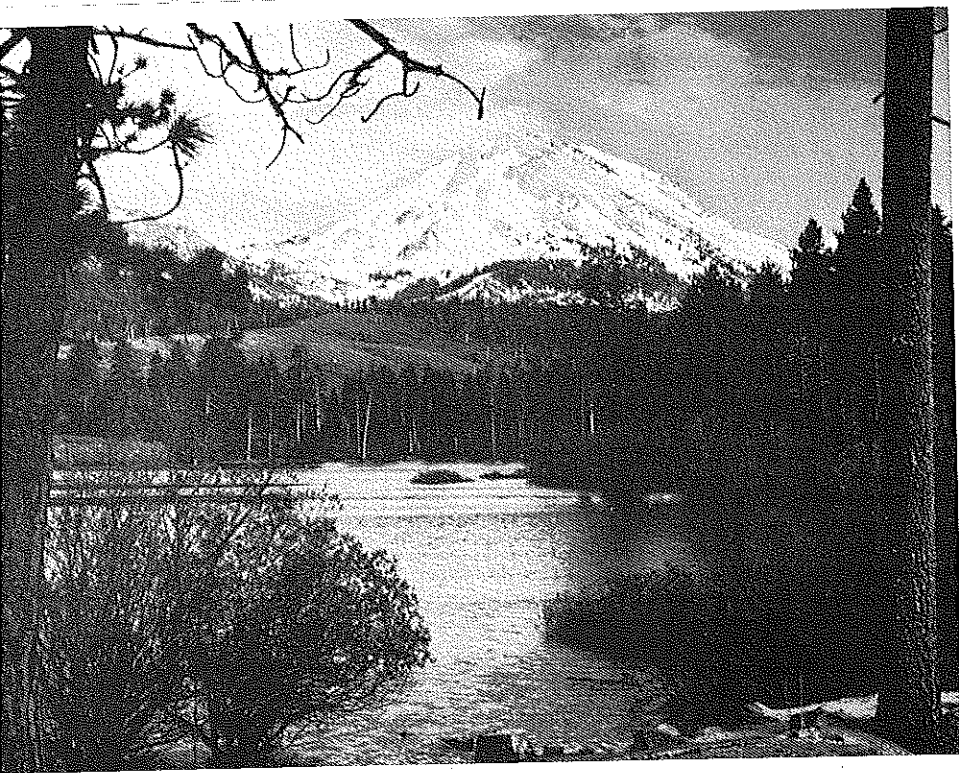
## Unit 1

### Changes in the earth's surface



Mountains and hills, bless the Lord;  
You springs, bless the Lord;  
    seas and rivers, bless the Lord;  
Let the earth bless the Lord  
    praise and exalt him above all forever.

*Daniel 3: 75 77-78 74*



### **Wonderful changes in the earth**

The earth has many wonders on its surface and just as many under its surface. Mountains rise high into the air. Some rise so high that the snow on their tops never melts. The oceans are just as deep in places as the mountains are high. There are many great rivers flowing through the land. Some flow through great plains, and others rush through deep gorges and canyons. Parts of the earth are thick forests, and parts are hot, dry deserts.

Men have always been curious about the earth—its mountains, its oceans, its rivers, its deserts, its continents, its islands, and its glaciers.

For centuries men have been exploring the land and the oceans, climbing the mountains, and finding out what is in the sea. It took man until 1953 to climb



Mt. Everest, which is 29,140 feet high. Men have gone deep down into the ocean. Have you ever wondered what the earth is like far beneath the surface?

Have you ever thought of yourself as an explorer? You really can be one. No matter where you live, there are many interesting things about the earth for you to see and learn about. The hills, rivers, valleys, rocks, and sand have a story to tell. Let's become explorers and discover the story they tell. As you hike through the country or ride with your parents in an automobile, learn to see the wonders around you. These wonders are God's creatures, and they are carrying out God's plan.

*Tell about the kind of country around your home.  
Make a list of the interesting things that you might  
explore in your neighborhood.*

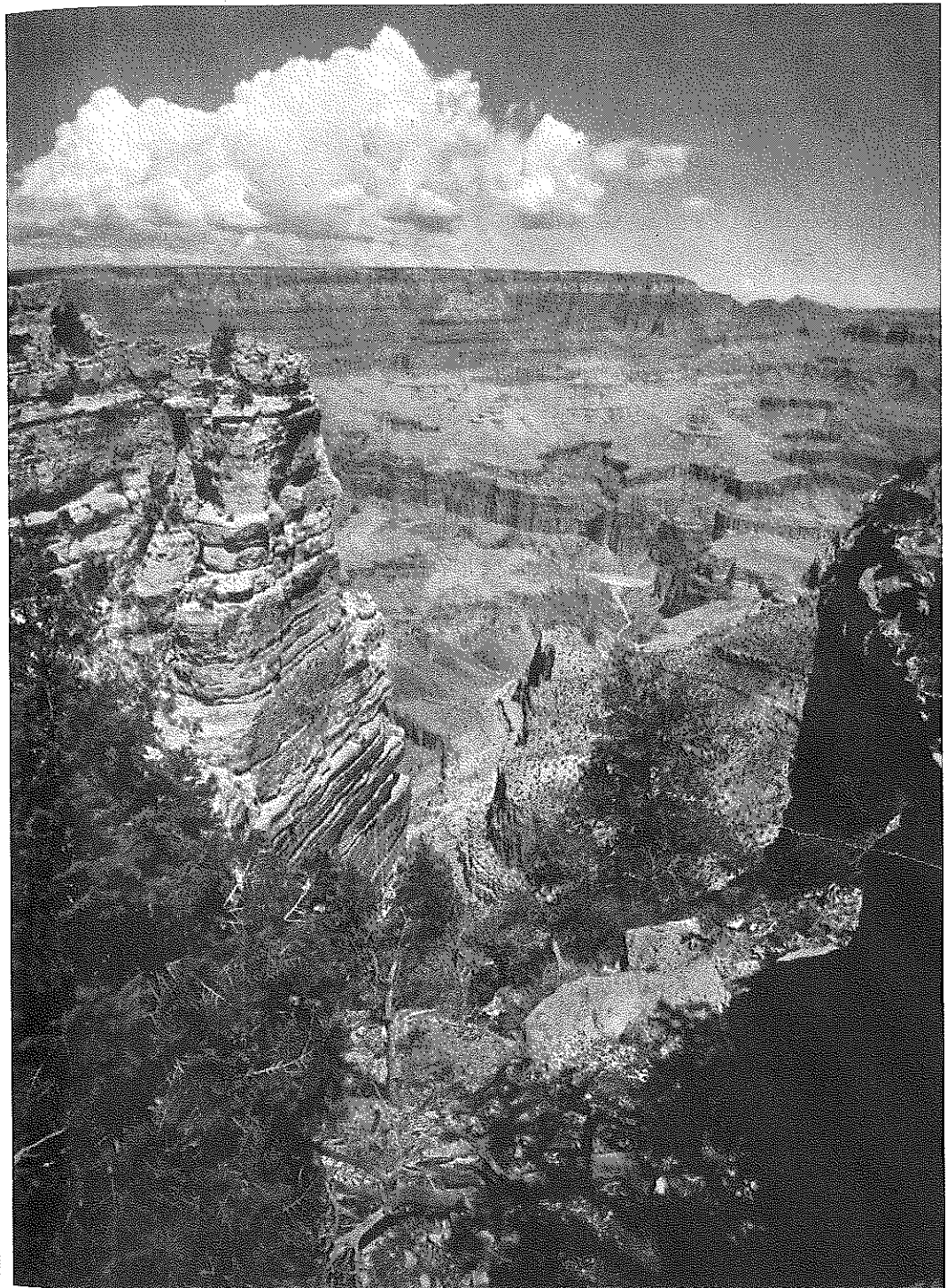
## How a river changed the earth's surface

One of the most beautiful sights in the world is the Grand Canyon of the Colorado. The Grand Canyon is located in the state of Arizona. The United States government has set aside a large area of land surrounding the canyon for a national park. The Grand Canyon is a great gash cut into the earth through the years by the waters of the Colorado River. Now the river flows for about one hundred miles in a deep gorge about a mile below the top of the canyon. At places the canyon is eighteen miles wide and at others it is only four miles wide.

Many thousands of people visit the Grand Canyon every year. The huge layers of rock through which the river has cut are of interest to all. Most tourists look only at the many colors of the walls and at the greatness of the canyon. But scientists study the side walls to learn the story of the changing nature of the earth's crust. They also study the plants and animals that live at the various depths of the canyon. The plants that live in the rocky canyon are like those that live in the desert. Most of the animals are small, like lizards.

When a canyon is started by a river, it looks like a V, wide at the top, narrow at the bottom, with sloping sides. You can see small V-shaped cuts in a newly

You can get an idea of how great the Grand Canyon of the Colorado is by comparing it with the river that flows at the bottom.



plowed field wherever heavy rains have dug into the soft earth. The force of the stream of water flowing through the cut crumbles and washes away the earth.

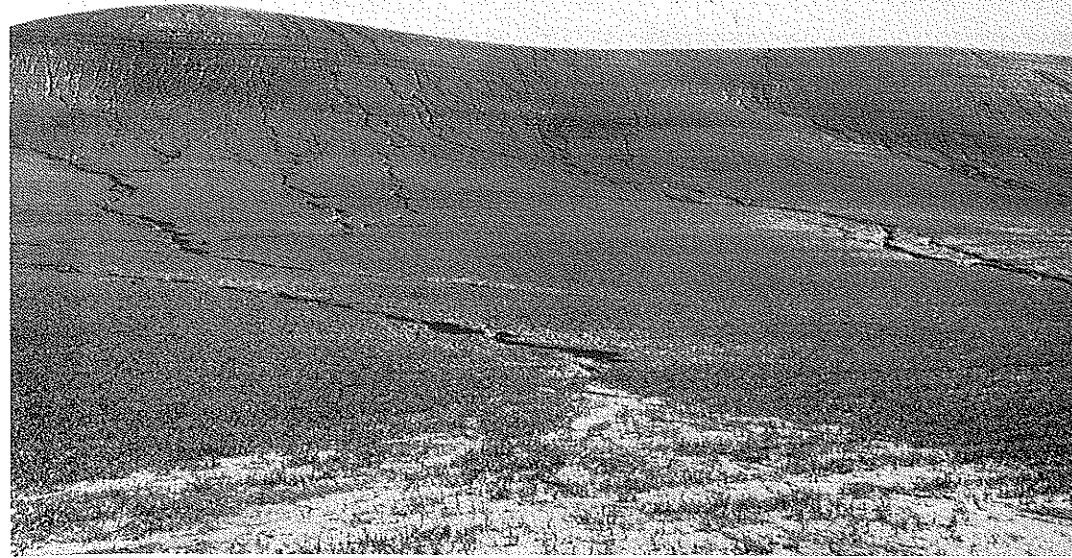
It took a great river like the Colorado to make a deep canyon like the Grand Canyon. The waters of the Colorado River flowed with great force and speed for a long, long time to wash away all the clay and sand and to break up rocks into more sand to wash away.

As the river washed away the rocks from the bottom of the canyon, the rocky sides fell in. These rocks were worn into sand and washed away. In this way the canyon became deeper and wider. As thousands and thousands of years passed, the canyon became still deeper and wider.

The surface of our earth is changing even today. Great rivers like the Colorado help make these changes. The surface of much of the earth is being changed by flowing water. Great canyons, valleys, ravines, and gullies are being made by rivers, creeks, and rainwater all around us.

Men have learned to use flowing water to make electricity to light cities and to run machinery. They have learned to build dams and walls to control the water. In this way they can keep the water where it is needed. Men are learning how to control the changes that water makes in the earth's surface.

*Are there any canyons, ravines, or gullies near your home? If so, describe one of them. What changes has it made in the earth's surface? Where does the water come from that made it?*

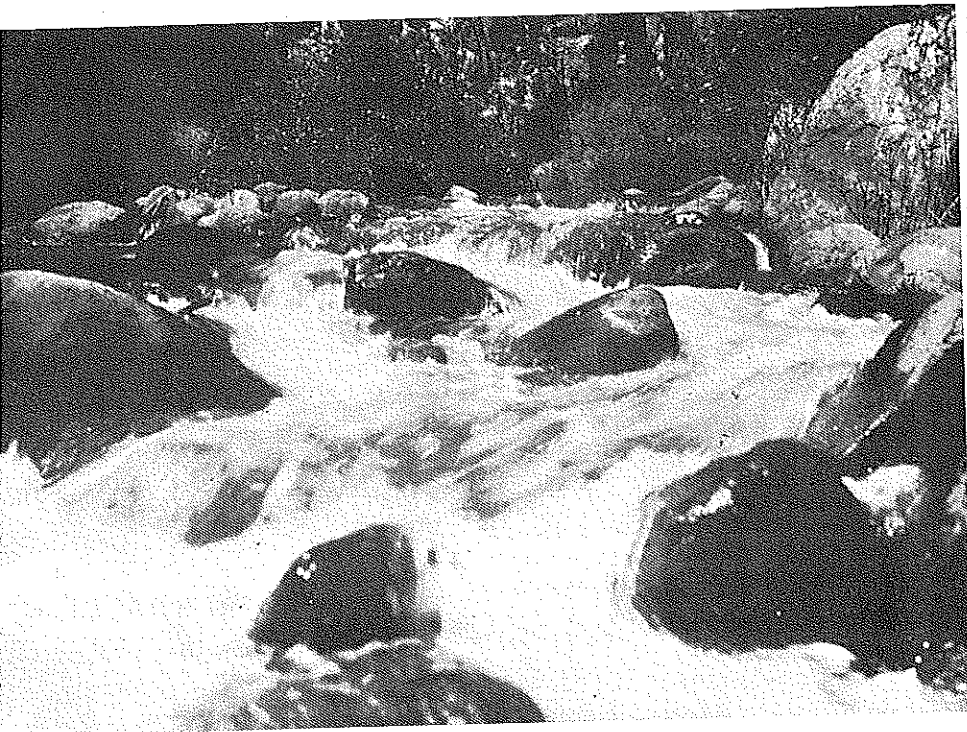


Water finds a soft place in the soil and then makes a path for itself. What does this path soon become?

### **How canyons and ravines start**

Scientists tell us that the Grand Canyon was caused by the tumbling waters coming down from the Rocky Mountains. The great snows and glaciers of the mountains melted, and the water rushed down, carrying sand, clay, and stones with it. The water wore away the soil and softer rock until a ditch or ravine was made.

The picture above shows how little canyons or ravines begin. This picture shows how the farmer has unwisely cut down the trees. Whenever it rains, the water runs off rapidly instead of sinking into the ground. The fast running water carries away the soil. If the farmer does not do something to stop this, the whole hillside will soon be a ravine.



Look at the picture above. What is the water doing here? What causes this to happen? The picture shows how a stream of water washes away the soft soil and sand. Then the big stones are left. Why has the water not worn away the stones?

The boy and girl in the picture on page 15 are finding out how a ravine starts. Notice that the water does not go in a straight line as it flows down the slope. Find one or two things that changed its direction. There is no more water running in the little ravine in picture 3 than there is in the ravine in picture 2. But the sides are falling into the water. This happens because the water is making the little ravine deeper.

You can make a little "canyon" in a corner of the garden. First loosen the soil in a space about three feet long and two feet wide. Then throw water in a stream from a garden hose against one spot. Why does your little "canyon" become V-shaped? When you are through, be sure to put the soil back the way you found it.

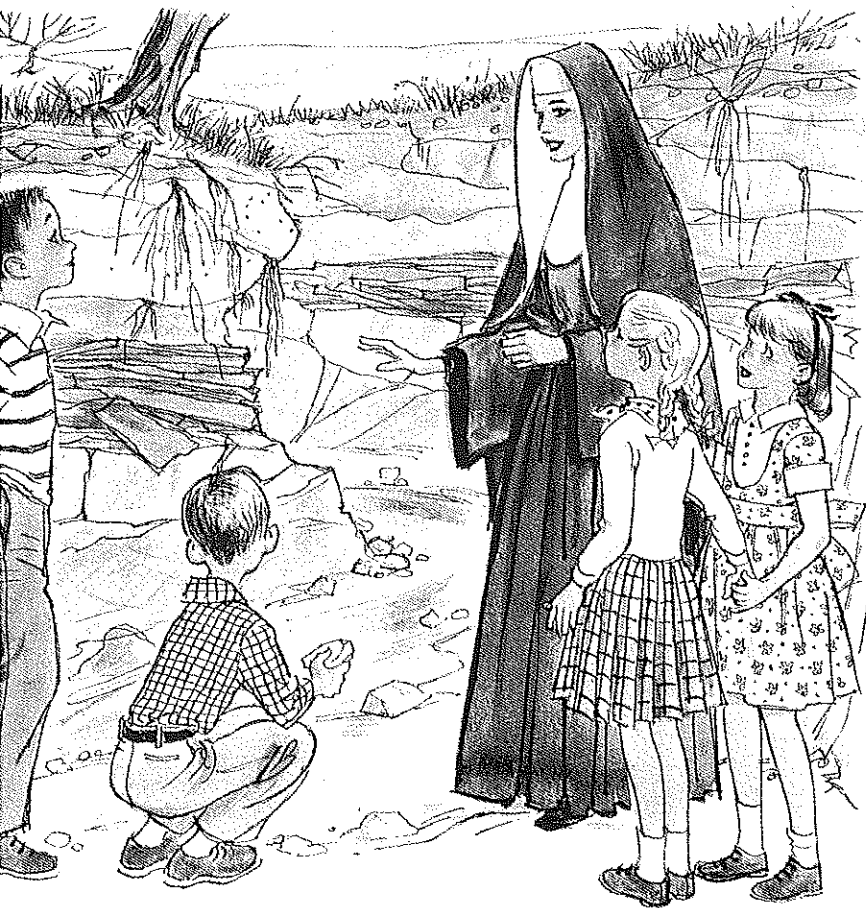
Make a collection of rocks. Be sure to have some that have been worn smooth by water and some that have not been worn by water. Where are you most likely to find smooth, round rocks? Why do you sometimes find them in other places?

*Last year you learned about the force that makes water flow downhill. What is this force?*

*Why do rivers not flow in a straight line?*

*What might stop a ravine or canyon from becoming deeper and wider?*





In a ravine you can see rock layers of different kinds.

### What a ravine is like

There are thousands of ravines in our country like the one in the picture above. At the bottom of this ravine is a little stream that helped to cut the steep sides of the ravine. It took many, many years to cut this ravine into the earth. You can see the layers of different materials that are in the sides of the ravine. Sometimes the layers of rocks in a ravine are curved. This was caused by the heavy rocks pressing down from above.

As time goes on, this ravine will grow larger and will change its shape. In some places along the bottom the water will wear away the soil and rock. This will leave a hole under the sides. Then the sides will fall in. It will take a long time before these changes happen. On the side of this ravine you can see a tree that will soon fall and uncover another part of the rock layer. As the sides of the ravine fall away, the soil falls away from the roots of the tree.

The picture at the left on page 18 shows a closer view of the sides of the ravine. The layers of rock are of different colors. The thin top layer is soft brown soil, covered with grass and trees. This is the topsoil in which plants grow. Under the topsoil is a layer of sand and small stones. The sand was made by the crumbling of soft rock called *sandstone*. Below the sandstone there is a layer of gummy earth called *clay*.

The next layer is made of closely packed layers of rock called *shale*. Shale is a thin rock. It was formed from mud tightly pressed for a long, long time. Shale is usually blue, gray, or green, and it often has an oily smell.

Then there is a layer of *limestone*. It is gray and cream-colored. The limestone was made of millions of skeletons of tiny animals and shells that were pressed for a long, long time by great weights of water or rock until they became rock. There was once a great sea or lake wherever you find limestone.

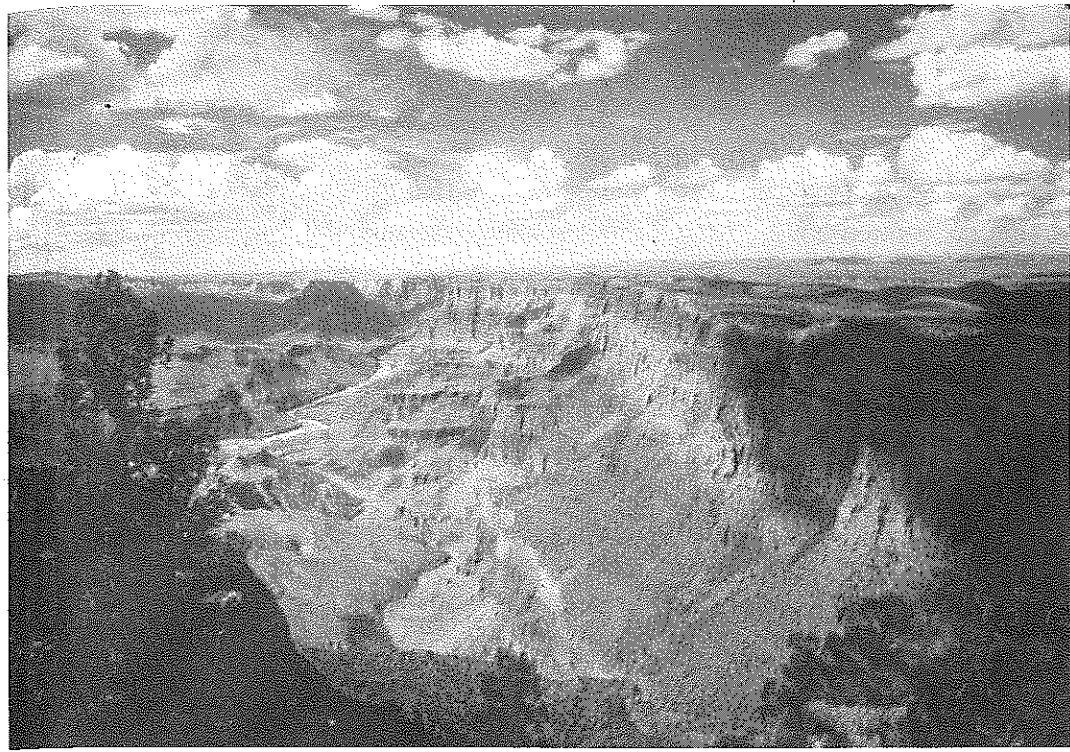
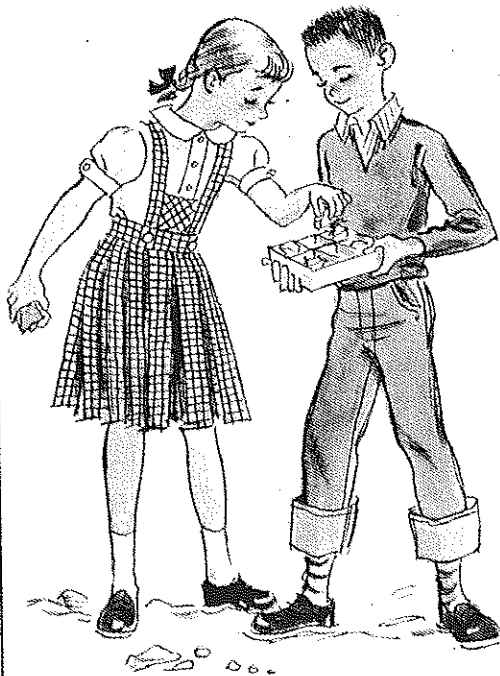
The hardest kind of rock in this ravine is called *granite*. This is the layer of dark rock near the bottom of the ravine. Only a strong blow with a hammer or a great weight pressing on granite can break it.

Many different kinds of rock can be collected from ravines like this one. When scientists test rocks from a ravine to find out what the rocks are made of, they learn a great deal about the earth around the ravine.

Rocks are important in many of man's activities. Coal is a rock that we mine for fuel. All of our metals come from rocks. Jewels are rocks. Cement is made by grinding up limestone.

*Where have you seen layers of rock of different kinds?*

Left: Fallen rock near the bottom of the ravine tells us the ravine is still growing and changing. Right: It is interesting to collect samples of rock and to learn about the kinds of rock you have.



The earth around the Grand Canyon is made up of layers of rock of beautiful colors.

### **The earth is made of many materials**

Both the ravine that we have been reading about and the Grand Canyon show that there are many different kinds of materials under the earth's surface. When we look at the sides of the Grand Canyon or the ravine, we can see streaks of different colors. These are layers of different kinds of rock.

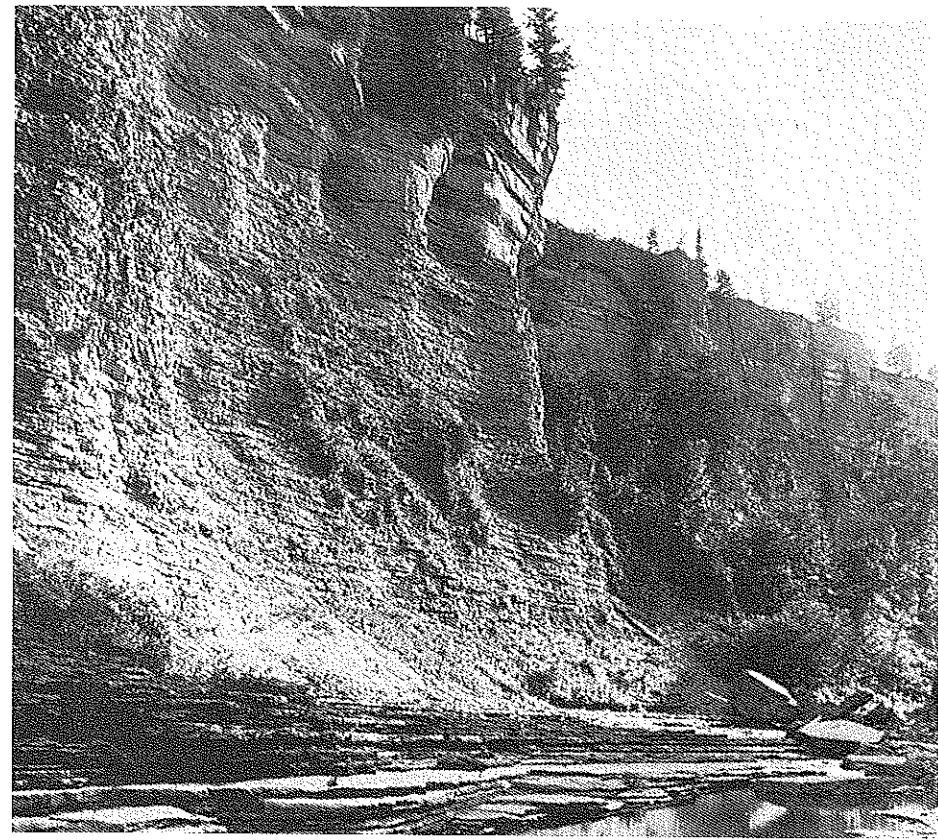
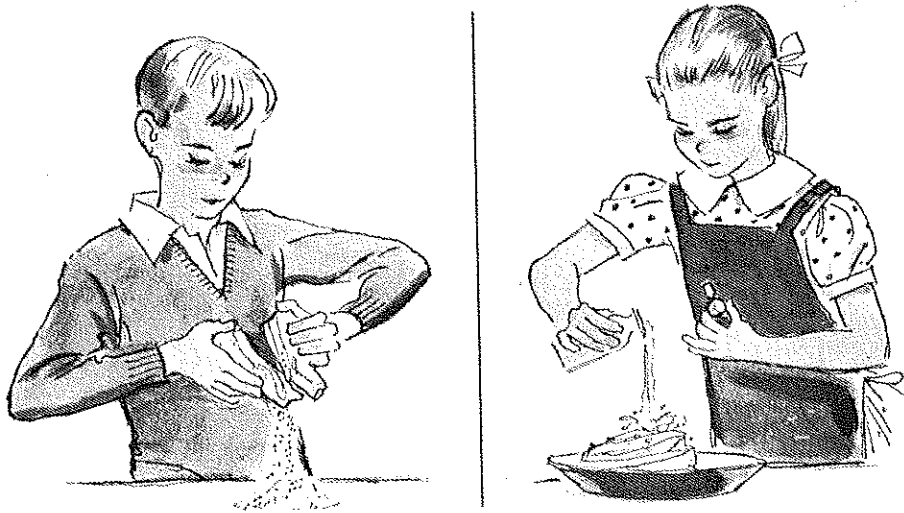
The Grand Canyon is one of the most beautiful sights in the world because it is so large and because it has such color. Sandstone makes one of the most beautiful colors we see in the walls of the Grand Canyon. The red layers of rock are sandstone.

The story of this sandstone is an interesting one. Because the sandstone is there, we know that a great sea once covered the land out of which the Colorado River cut the Grand Canyon.

Sandstone is made by the sea. Sand is carried out to sea by the water which washes against a sandy shore. As the water becomes calm, the sand settles to the bottom of the sea. Mixed in with the sand are clay and other materials that hold the grains together. The great weight of the water above helps press the grains together. After a long time the sand becomes sandstone.

Sand is really very small pieces of stone that has been ground up by water and ice. The stones from which the sand is made may be of any kind and of any color. Sandstone may be a bright color. It sometimes sparkles in the sunlight. For this reason the Red Wall of the Grand Canyon is a brilliant sight in the sunshine.

The boy is changing two pieces of sandstone back to sand by rubbing them together. The girl is pouring weak acid on limestone. Bubbles form as the acid dissolves the limestone.



We learned on page 17 that there is another kind of stone made by the sea. This is *limestone*, made of the skeletons of tiny animals. It is gray in color. There is a layer of limestone in the picture of the Grand Canyon on page 11.

Limestone does not crumble up easily as sandstone does. But there are materials in water that cause limestone to become part of the water. Limestone slowly *dissolves* in the water and is washed away.

The picture at the top of the page shows a kind of stone that we often see in ravines. It is usually blue, gray, or green in color and has an odor like clay or oil. This stone is called *shale*. One of the layers of stone in the picture of the Grand Canyon on page 11 is shale.

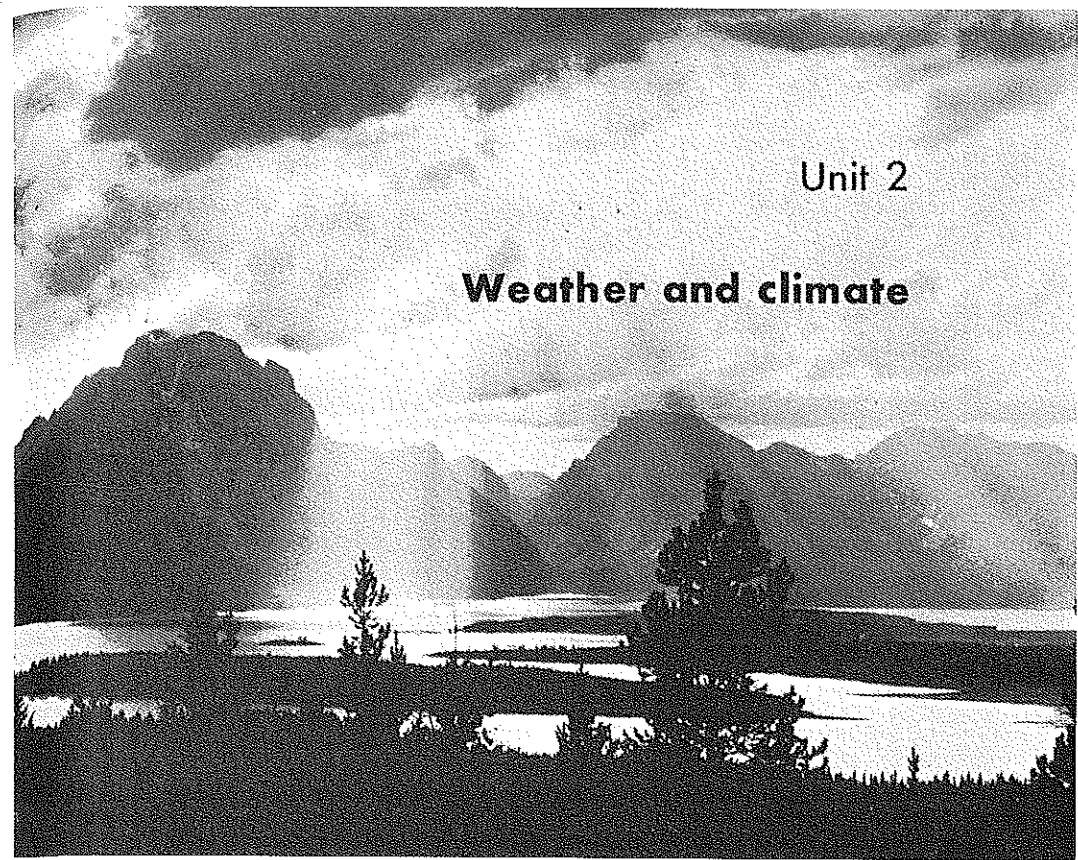
## What have you learned?

1. How do plants change the earth's surface?
2. Has there been an eruption of a volcano recently? If so, describe what happened.
3. Here are some important words you used in this unit. Be prepared to tell something about each.

boulder	eruption	limestone
canyon	geyser	sandstone
crater	glacier	shale
dissolve	granite	topsoil
earth's crust	humus	volcano
erosion	lava	weathered

## Let's do these

1. Make a booklet or posters showing changes in the earth's surface. Look in old magazines for pictures. Write a sentence or two to tell about each picture.
2. Find some rocks with cracks in them. Pour water into the cracks and put the rocks on the freezing shelf of a refrigerator or in a deep-freeze. Report what happens.
3. Watch the newspapers for stories about volcanoes and earthquakes. Put them in your booklet or on the bulletin board.
4. Find out what a fossil is.
5. Make a list of the ways in which the earth's surface is being changed.
6. Make a list of the wonders of the world that you would like to see. Find out about each one.



Unit 2

## Weather and climate

Every shower and dew, bless the Lord;  
all you winds, bless the Lord.  
Fire and heat, bless the Lord;  
cold and chill, bless the Lord.  
Dew and rain, bless the Lord;  
frost and cold, bless the Lord.  
Ice and snow, bless the Lord;  
nights and days, bless the Lord;  
Light and darkness, bless the Lord;  
lightnings and clouds, bless the Lord.

*Daniel 3: 64-73.*