

LANDFORMS, WEATHERING, AND EROSION

1 HOW MANY PEOPLE HAVE BEEN TO THE ROCKY MOUNTAINS OR THE GRAND CANYON? WHEN PEOPLE GO TO VISIT THESE NATURAL WONDERS, THEY MAY NOT REALIZE THAT IT TOOK MILLIONS OF YEARS FOR EACH OF THEM TO FORM. TODAY, THE EARTH CONTINUES TO GO THROUGH CHANGES THAT AFFECT THE LAND AROUND US. MANY OF THESE CHANGES, SUCH AS THE FORMATION OF A CANYON OR MOUNTAIN RANGE CAN TAKE MILLIONS OF YEARS.

2 MANY OF THE CHANGES TO THE EARTH'S SURFACE COME ABOUT THROUGH THE PROCESS OF WEATHERING, EROSION, AND DEPOSITION. THE SURFACE OF THE EARTH IS CONSTANTLY EXPOSED TO WATER, WIND, ICE, AND GROWING PLANTS. EACH OF THESE CAN BREAK DOWN ROCKS INTO SMALLER AND SMALLER PIECES. THIS BREAKING DOWN OF THE ROCKS IS CALLED WEATHERING. WATER CAN CAUSE SOME ROCKS AND MINERALS TO DISSOLVE. WHEN THIS HAPPENS UNDERGROUND, HUGE CAVERNS CAN BE FORMED. WATER RUSHING THROUGH THESE UNDERGROUND CAVES PUSHES THE SMALLER BITS OF ROCK AND SAND AWAY AND SMOOTHS DOWN ROUGH EDGES OF LARGER ROCKS. STRONG WINDS CAN ALSO BREAK DOWN LARGE ROCKS INTO SMALLER PIECES AND SMOOTH OUT ROUGH PARTS OF LARGE ROCKS. THE WIND CAN CARRY AWAY VERY SMALL PIECES OF ROCKS AND DIRT TO OTHER PLACES. ICE CAN CAUSE ROCKS TO BREAK AS WELL. WHEN WATER SEEPS INTO SMALL CRACKS OF ROCKS AND FREEZES, THE ICE EXPANDS AND BREAKS THE ROCK. PLANTS CAN ALSO BREAK SOME ROCKS AS THEIR ROOTS GROW UNDERGROUND. THE ROOTS SPREAD INSIDE CRACKS AND CAUSE THE ROCKS TO BREAK APART.

3 WHEN WATER AND WIND CARRY SMALL PIECES OF ROCK, SAND, AND DIRT FROM ONE PLACE TO ANOTHER IT IS CALLED EROSION. EROSION CARRIES MATERIALS THAT HAVE BEEN WEATHERED AWAY FROM A PLACE. THESE MATERIALS ARE THEN DROPPED AND LEFT IN A NEW PLACE IN THE FINAL PART OF THE CYCLE. THE CYCLE THAT BEGAN WITH WEATHERING AND CONTINUED WITH EROSION IS NOW CONCLUDED WITH DEPOSITION. DEPOSITION IS THE LEAVING OF THE PARTICLES IN A NEW PLACE. THE CYCLE OF WEATHERING, EROSION, AND DEPOSITION DESTROYS OLD NATURAL STRUCTURES AND CREATE NEW ONES. THIS CYCLE IS RESPONSIBLE FOR CREATING MANY OF THE NATURAL STRUCTURES ON THE EARTH. THESE NATURAL STRUCTURES ARE CALLED LANDFORMS.

4 SOME OF THE MOST COMMON LANDFORMS CREATED BY MOVING WATER ARE CANYONS. AS RIVERS FLOW, THEY WEATHER AND ERODE THE SURFACE OF THE EARTH AROUND THEM. THE RIVERS LITERALLY CARVE DEEPER AND DEEPER INTO THE EARTH'S SURFACE. AFTER MANY YEARS, THE RIVERS HAVE CUT DEEPLY INTO THE SURFACE OF THE EARTH. THE HIGH WALLS ON EITHER SIDE OF A RIVER ALONG WITH THE RIVER ITSELF ARE NOW KNOWN AS A CANYON. THE GRAND CANYON IN ARIZONA WAS FORMED BY THE WEATHERING AND EROSION CAUSED BY THE COLORADO RIVER.

5 MOVING WATER AND WIND ARE THE MAJOR FORCES BEHIND WEATHERING, EROSION, AND DEPOSITION, BUT ICE CAN ALSO GENERATE THE CYCLE. IN MANY COLD PARTS OF THE WORLD THERE ARE VERY LARGE SHEETS OF ICE ON THE EARTH'S SURFACE. THESE HUGE CHUNKS OF ICE ARE CALLED GLACIERS. GLACIERS MOVE VERY SLOWLY ACROSS THE EARTH'S SURFACE. AS GLACIERS MOVE, THE ICE SCRAPES AWAY PEBBLES, ROCKS, AND EVEN LARGE BOULDERS. AS THE GLACIER DRAGS THE PIECES OF ROCK ALONG, HOLES ARE FORMED IN THE LAND. IF A GLACIER MELTS, SOME OF THE ROCK AND DIRT IS LEFT BEHIND, COMPLETING THE CYCLE OF WEATHERING, EROSION, AND DEPOSITION. SOME OF THE GLACIERS LEAVE BEHIND OPEN HOLES IN THE SURFACE OF THE EARTH THAT ARE LARGE

ENOUGH THAT THEY ARE CONSIDERED VALLEYS. AS GLACIERS MELT, THESE VALLEYS CAN FILL WITH WATER TO FORM LAKES.

6 THE AREA WHERE THE LAND MEETS THE OCEAN IS CALLED THE COASTLINE. BECAUSE THIS COASTLINE IS A PLACE WHERE WATER IS CONSTANTLY CRASHING AGAINST THE LAND, THE PLACE IS ALWAYS CHANGING. THE LAND AREA NEXT TO THE OCEAN MAY BE FILLED WITH ROCKY CLIFFS OR SANDY BEACHES. WINDS THAT PUSH WAVES TOWARD THE SHORE WEATHER AWAY ROCKS ON THE SHORE. THESE SAME WAVES CAN ERODE AWAY THE SAND ON THE BEACH OR DEPOSIT MORE SAND ONTO THE BEACH.

7 THE NATURAL CYCLE OF WEATHERING, EROSION, AND DEPOSITION DOES NOT CREATE ALL OF THE EARTH'S LANDFORMS. SOME MOUNTAINS ARE CREATED WHEN LAND IS SQUEEZED TOGETHER. WHEN THIS HAPPENS, SOME OF THE SURFACE OF THE EARTH IS PUSHED UPWARD, FORMING A MOUNTAIN RANGE. THE APPALACHIANS IN NORTH AMERICA WERE FORMED IN THIS WAY. OTHER TYPES OF MOUNTAINS ARE MADE WHEN LAND SLIDES UPWARD OR DOWNWARD ALONG A CRACK IN THE EARTH'S SURFACE CALLED A FAULT.

8 CANYONS AND MOUNTAINS TAKE A LONG TIME TO FORM. SOME THINGS CAN CHANGE THE EARTH'S SURFACE RELATIVELY QUICKLY. VOLCANOES, EARTHQUAKES, FLOODS, AND LANDSLIDES CAN CAUSE RAPID CHANGES TO THE SURFACE OF THE EARTH. VOLCANOES ARE FORMED WHEN MELTED ROCK, CALLED MAGMA, FROM DEEP INSIDE THE EARTH PUSHES UPWARD AND BREAKS THROUGH THE EARTH'S SURFACE. WHEN THE MAGMA PUSHED UPWARD, IT CAUSED THE LAND TO RISE FORMING A VOLCANO. WHEN THE MAGMA MAKES IT TO THE SURFACE IT IS CALLED LAVA. WHEN THE MAGMA PUSHES OUT ONTO THE SURFACE OF THE EARTH AS LAVA, IT IS KNOWN AS AN ERUPTION. AN ERUPTION NOT ONLY CAN THROW LAVA ONTO THE EARTH'S SURFACE, BUT CAN ALSO THROW ASH, HOT BOULDERS, AND GASES INTO THE AIR. VOLCANOES CAN BE VERY DESTRUCTIVE. EARTHQUAKES HAPPEN WHEN GIANT PIECES OF ROCK PUSH AGAINST EACH OTHER UNDERNEATH THE EARTH. THESE PIECES OF ROCK TOUCH EACH OTHER ALONG A FAULT. WHEN THE ROCKS PUSH AGAINST EACH OTHER, ONE OF THE PIECES SUDDENLY BEGINS TO MOVE A SHORT DISTANCE. THE FORCE OF THIS MOVEMENT CAUSES POWERFUL WAVES TO SPREAD OUT FROM THE POINT WHERE THE PIECES OF ROCK HAVE PUSHED AGAINST EACH OTHER. THESE WAVES ARE WHAT IS KNOWN AS AN EARTHQUAKE. LANDSLIDES ARE CAUSED WHEN THE FORCE OF GRAVITY PULLS DOWN SOME OF THE LAND ON THE SLOPE OF A HILL. DIRT AND ROCK THEN COME CRASHING DOWN ONTO THE SURFACE. THE LOOSENED ROCK AND DIRT IS USUALLY ERODED AWAY AND DEPOSITED SOMEWHERE ELSE. FLOODS ARE USUALLY CAUSED BY HEAVY RAIN. FLOODWATER CAN WEATHER AND ERODE ROCK AND OTHER LANDFORMS AS THE WATER RUSHES ACROSS THE LAND. DIRT ERODED AWAY IN A FLOOD IS DEPOSITED IN A NEW PLACE, USUALLY AT THE MOUTH OF A RIVER.

9 THE FACE OF THE EARTH IS ALWAYS CHANGING. FORCES SUCH AS WATER, WIND, AND ICE CREATE MANY OF THESE CHANGES. THESE FORCES CAUSE ROCKS AND OTHER LANDFORMS TO BREAK DOWN IN A PROCESS KNOWN AS WEATHERING. THESE FORCES CAN ALSO MOVE PIECES OF THE EARTH IN A PROCESS KNOWN AS EROSION. WHEN THE PIECES OF EARTH ARE LEFT IN A NEW PLACE IT IS CALLED DEPOSITION. IT NORMALLY TAKES MANY, MANY YEARS FOR THE CHANGES TO BE NOTICEABLE. MILLIONS OF YEARS FROM NOW, THE SURFACE OF THE EARTH MAY LOOK MUCH DIFFERENT THAN IT DOES TODAY.