



A Need for Alternative Energy

We use energy every day.

It fuels cars and powers cell phones. It cools homes when it's hot outside and warms them when the weather turns cold. It provides light through the night while the sun shines on the other half of the world.

All this energy must come from somewhere. Since the 1700s, people have relied mostly on fossil fuels such as coal, oil, and natural gas. These materials burn easily to create heat and can be turned into electricity. But they are far from perfect.

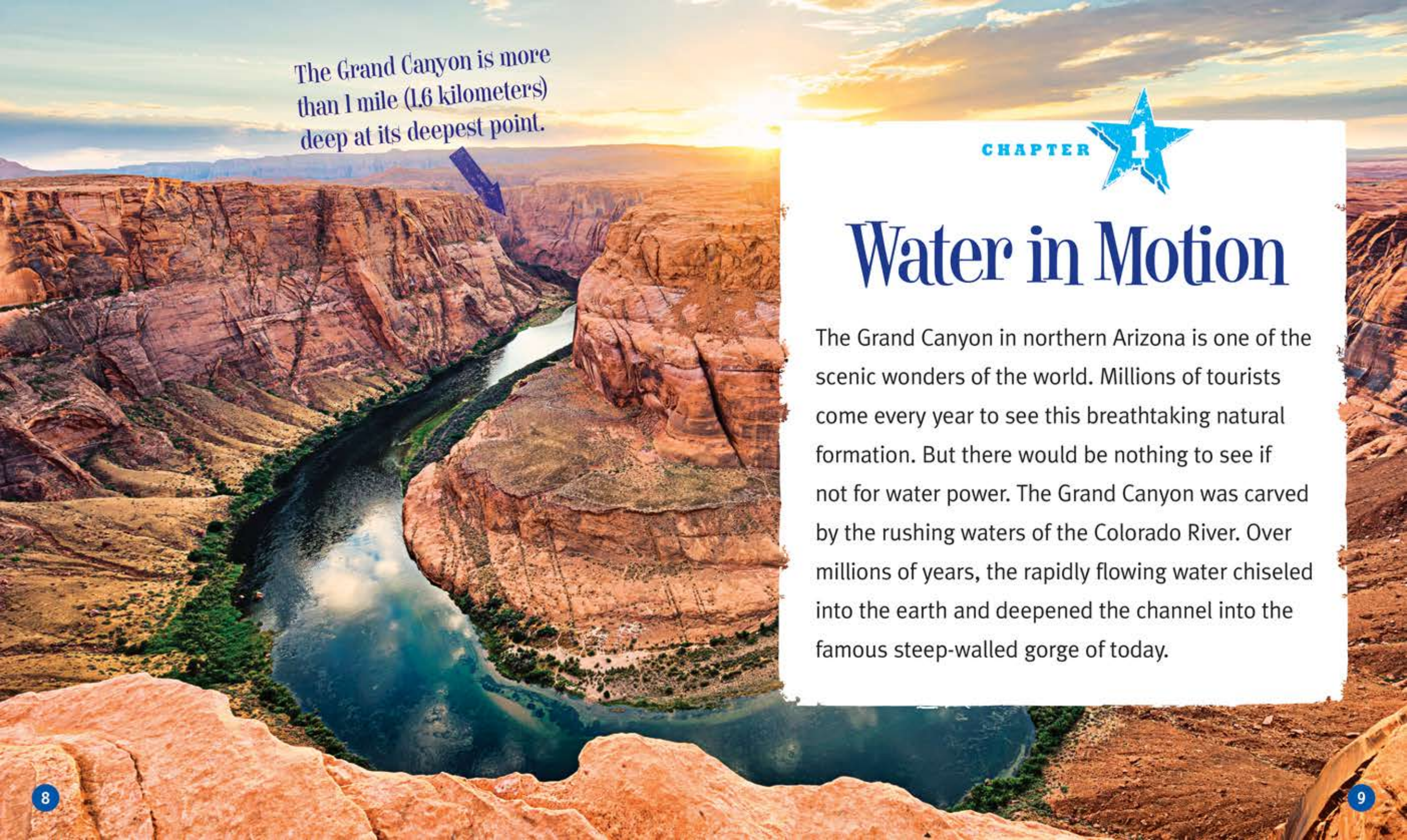
Our supply of fossil fuels is limited. Experts predict that **fossil fuels will dwindle and their cost will rise**. In addition, **burning these fuels releases harmful substances**.

Some substances trap heat within the atmosphere, leading to **climate change**. Others cause health problems, including heart and lung diseases.

What Can We Do?

Renewable energy sources, such as solar, wind, water, and geothermal, are healthier sources than fossil fuels. They can serve our electricity needs while reducing the damage done to the planet and us.

Turn the page and learn the secrets of one of these alternative energies: water power.



The Grand Canyon is more than 1 mile (1.6 kilometers) deep at its deepest point.

CHAPTER



Water in Motion

The Grand Canyon in northern Arizona is one of the scenic wonders of the world. Millions of tourists come every year to see this breathtaking natural formation. But there would be nothing to see if not for water power. The Grand Canyon was carved by the rushing waters of the Colorado River. Over millions of years, the rapidly flowing water chiseled into the earth and deepened the channel into the famous steep-walled gorge of today.

Waterwheels and Water Mills

A waterwheel uses water power to do mechanical work such as grinding grain. It is a large wheel with wide paddles. As flowing water passes over the paddles, the wheel turns on an **axle**. The movement of the axle can then power a variety of machines. The Greeks and other cultures used waterwheels by at least the 1st century BCE. By the 6th century CE, water mills were common throughout Europe.

It's Electric!

Late in the 1800s, people found another use for water power: generating electricity. In 1882, the world's first hydroelectric plant began operating on Wisconsin's Fox River. It used the natural movement of the river to generate enough electricity to light up the power plant itself and two nearby buildings. Since then, the technology behind hydroelectric power plants has been greatly improved.

Timeline of Water Power

100 BCE

Ancient Greeks and other cultures used waterwheels for irrigation, grinding grain, and other purposes.

1700s CE

1700s CE

French engineer Bernard Forest de Belidor writes *Architecture hydraulique*, a landmark work about the construction of waterwheels, pumps, and other water-powered devices.

1882

The world's first hydroelectric power plant is built to power a paper mill in Appleton, Wisconsin.

1882



1894

Nikola Tesla's hydroelectric station at Niagara Falls provides electricity to Buffalo, New York.

1894



1941

1941
The Grand Coulee Dam, the largest hydropower dam in the United States, begins operation.

1966

La Rance, the world's first tidal power plant, begins operations in France.

1966



2009

2009
Three Gorges Dam, the world's largest hydropower station, starts bringing electricity to cities in China.

2017

Hydropower is used to generate about 16 percent of the world's electricity.

2017