

Geography: Exploring Our World

by Carollyne Hutter

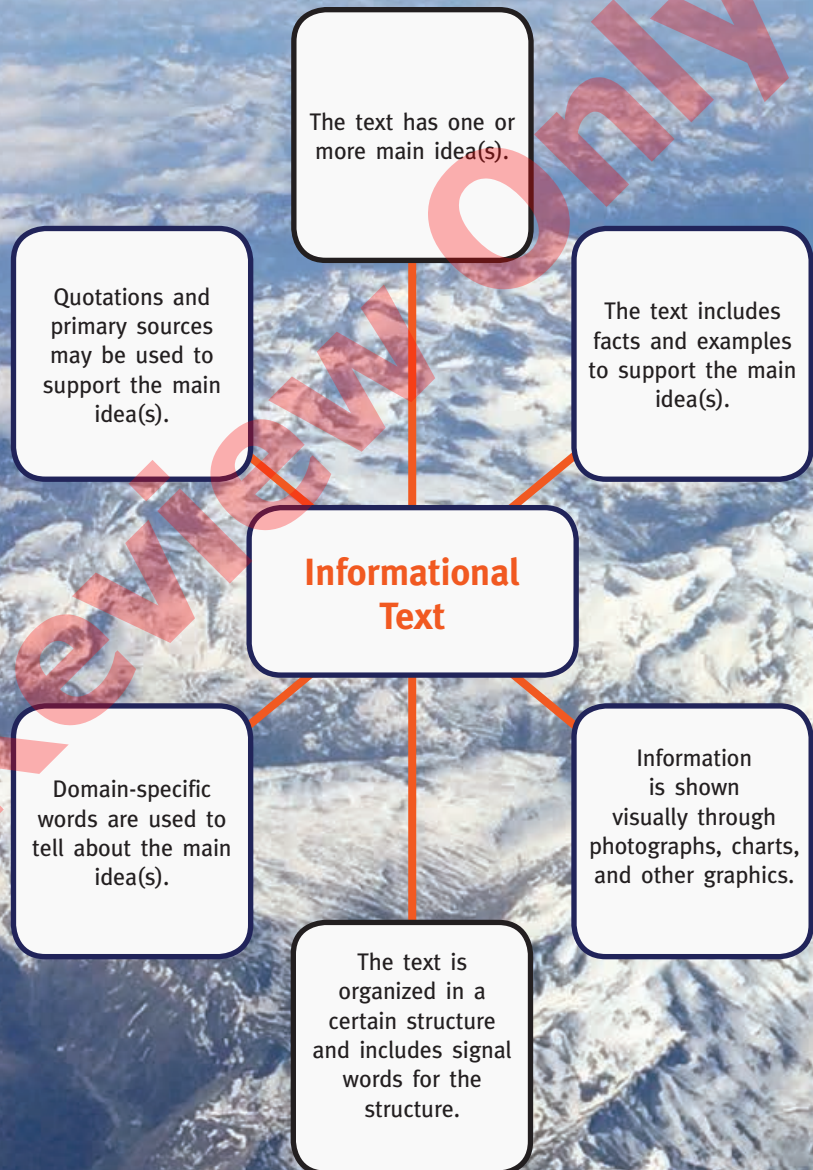
What do
geographers do?



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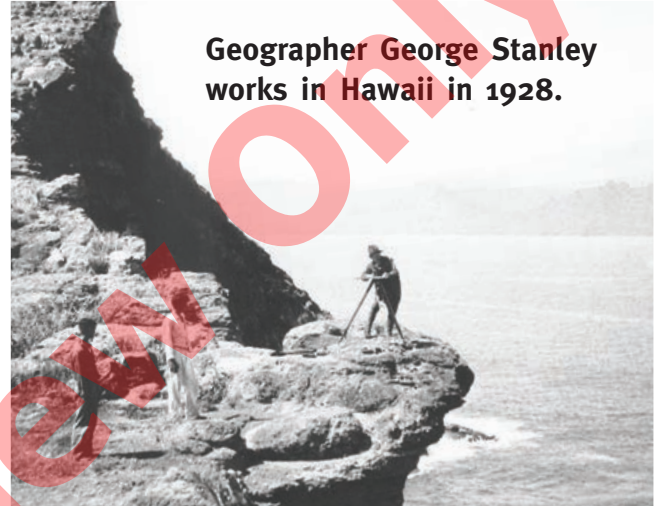
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Geography:

The Study of Earth

Geography is the study of the land, water, and climates of Earth, and also the study of human activity on Earth. The word *geography* has its roots in ancient Greece. The Greek scientist Eratosthenes (air-uh-TAHS-theh-nee-z) was the first to use the word *geography*. Eratosthenes was also the first known person to figure out the size of Earth. He did this by observing shadows cast by the sun. This was a major accomplishment at the time.



Geographer George Stanley works in Hawaii in 1928.

▼ Geographers study how Earth's surface shapes human activity, and how human activity shapes Earth.



Eratosthenes

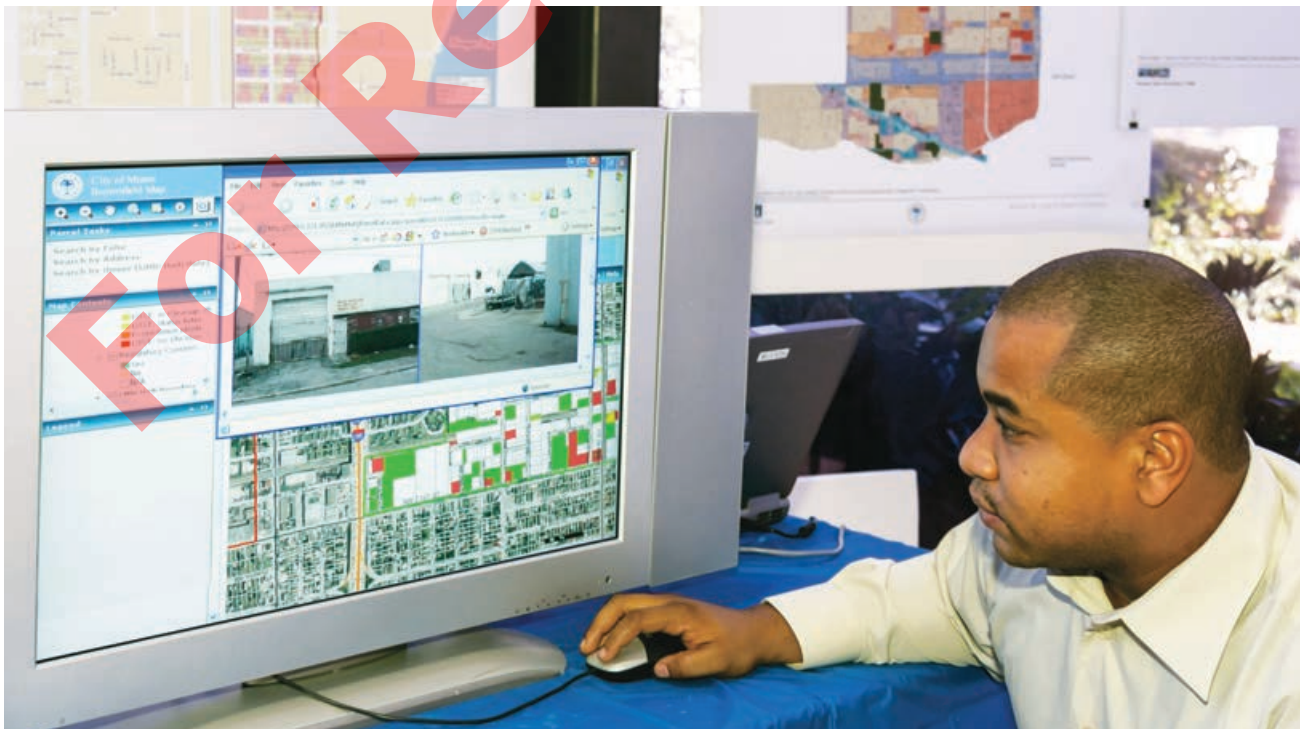


Geographers—people who study geography—continue to make discoveries and do important work. Today, geography is used to protect people, grow businesses, predict changes in population, and much more. Thanks to improvements in technology, geographers have amazing tools, such as computers, to do their work.

Learn about geography by taking a peek into what geographers do today. This book describes the important work of geographers Nathan Wood and Joseph Kerski. They use geography tools to help **communities** around the world.



▼ Geographers use computers to create special maps that show important information about an area.



Meet Nathan Wood: Disaster Geographer



At a beach in Oregon, the sky is clear and blue. The sun is shining. Suddenly the ground shakes for several minutes, and the ocean quickly pulls away from the shore soon after. Just when it seems that the ocean has disappeared, a huge wave rushes forward. It is a **tsunami**!



▲ Oregon coastline

Across the country, the sky is dark above the Florida coast. A **hurricane** is approaching with winds of 120 kilometers per hour (75 miles per hour). The ocean water is choppy. Strong winds push water farther inland. This is called a storm surge. Together, heavy rain, high winds, and the storm surge pound away at the coast.

▼ The Atlantic Ocean hurricane season is June 1 to November 30. This is the time when hurricanes can affect Florida.



Tsunamis, hurricanes, coastal storms, volcanoes, and other natural **hazards**—this is what Nathan Wood studies. He's a geographer for the U.S. Geological Survey (USGS), which is part of the federal government.

Wood helps communities throughout the United States and in other countries prepare

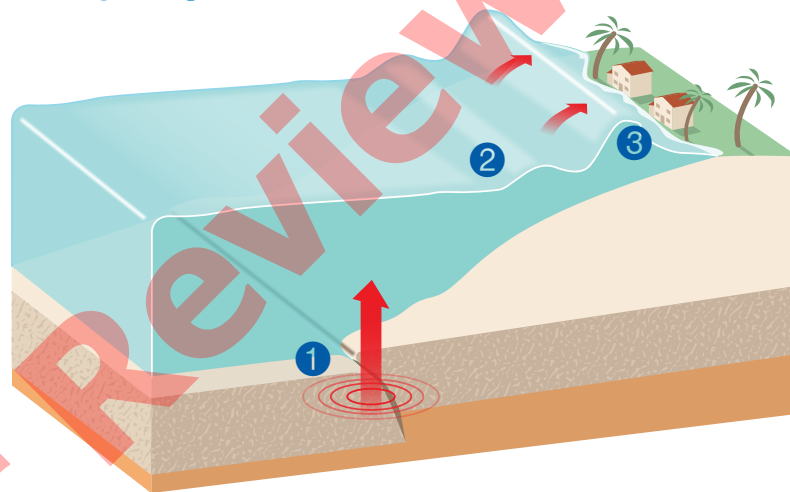
for natural hazards. He focuses on hazards that occur along coastlines.

"My research looks at how humans interact with natural hazards," Wood explains. "Earth and nature are constantly changing. Whether it's a volcano, hurricane, or tsunami, I want people to survive."

Hazard from Below and Above

How a Tsunami Forms

A tsunami is a series of large ocean waves usually caused by an underwater earthquake or a volcanic explosion.



1 An earthquake occurs under the ocean, creating waves.

2 Waves move across the ocean, traveling as fast as 800 kph (500 mph).

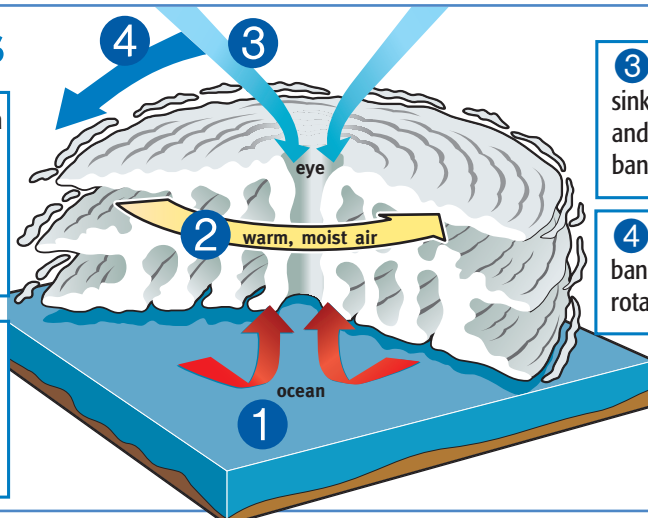
3 Waves slow down and get taller as they enter shallow water.

How a Hurricane Forms

A hurricane is a large, moving storm. It forms in the sky and brings with it rain and strong winds of 120 to 300 kph (75 to 200 mph).

1 Warm ocean water creates humid air that rises from the ocean's surface.

2 The rising warm, moist air forms clouds in bands around the eye.



3 Cool, dry air sinks in the eye and between the bands of clouds.

4 The rising bands of clouds rotate.

According to the National Oceanic and Atmospheric Administration, 123 million people live on the coast in the United States. Many big cities with large populations are in coastal areas. When a storm like a hurricane or a tsunami strikes the coast, people can lose their homes and businesses, or even their lives.

Natural scientists study whether a storm or a tsunami is going to happen, and where on the coast it will hit. The areas where storms may hit are called hazard zones.

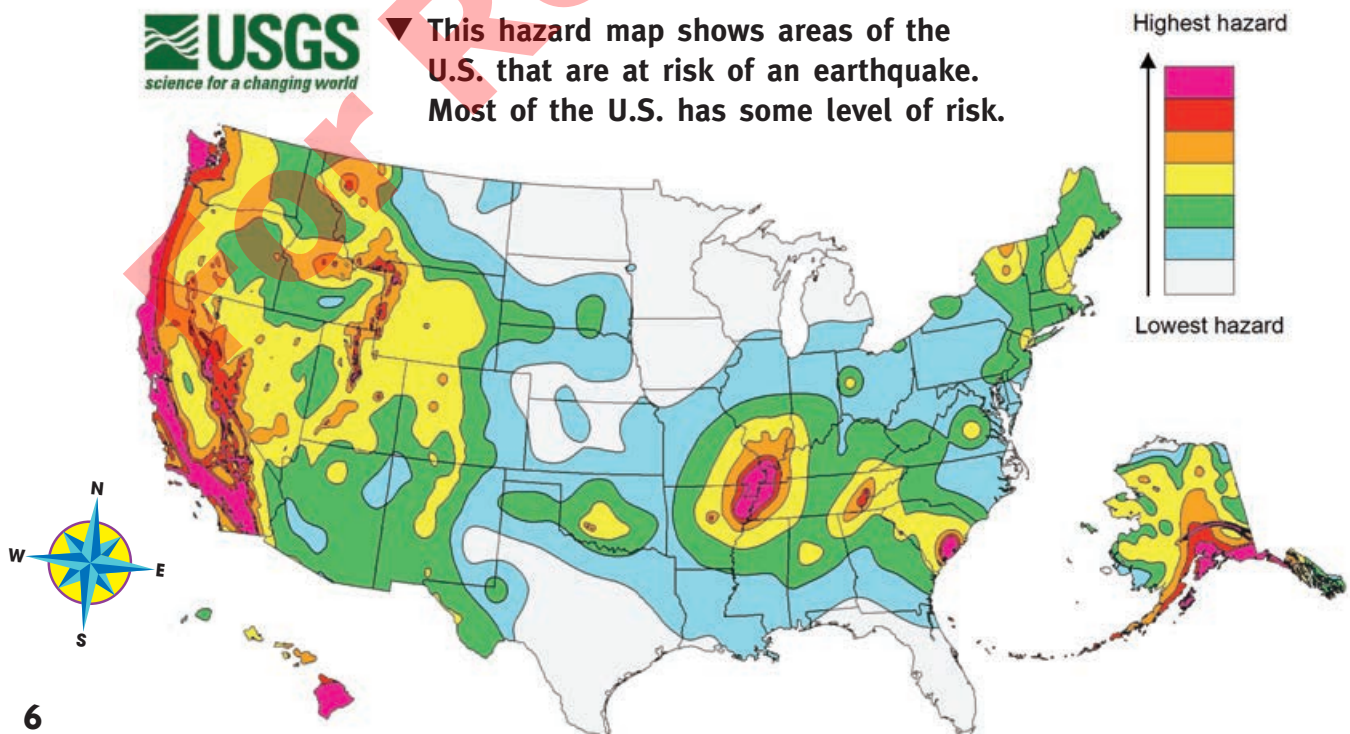


▲ Many of the largest U.S. cities are on or near the coast.

“Natural scientists will map the hazard zones. Then I use mapping tools to locate people, bridges, roads, and businesses. I figure out who is exposed to these extreme events. And I figure out if the people can make it out in time,” explains Wood.



▼ This hazard map shows areas of the U.S. that are at risk of an earthquake. Most of the U.S. has some level of risk.



Tools Geographers Use

Geographers use a variety of special tools to do their work. For instance, Wood and other geographers use remote-sensing tools. Remote sensing is a way of collecting information about an object from a distance.

Remote sensing includes the use of a satellite. A satellite is a machine in space that revolves around Earth. It collects information with built-in cameras and sensors. When used for remote sensing, a satellite can take pictures of hurricanes and other natural hazards happening on Earth. The images are sent to a computer. Scientists then look at the images and other information to figure out the size and path of a storm.



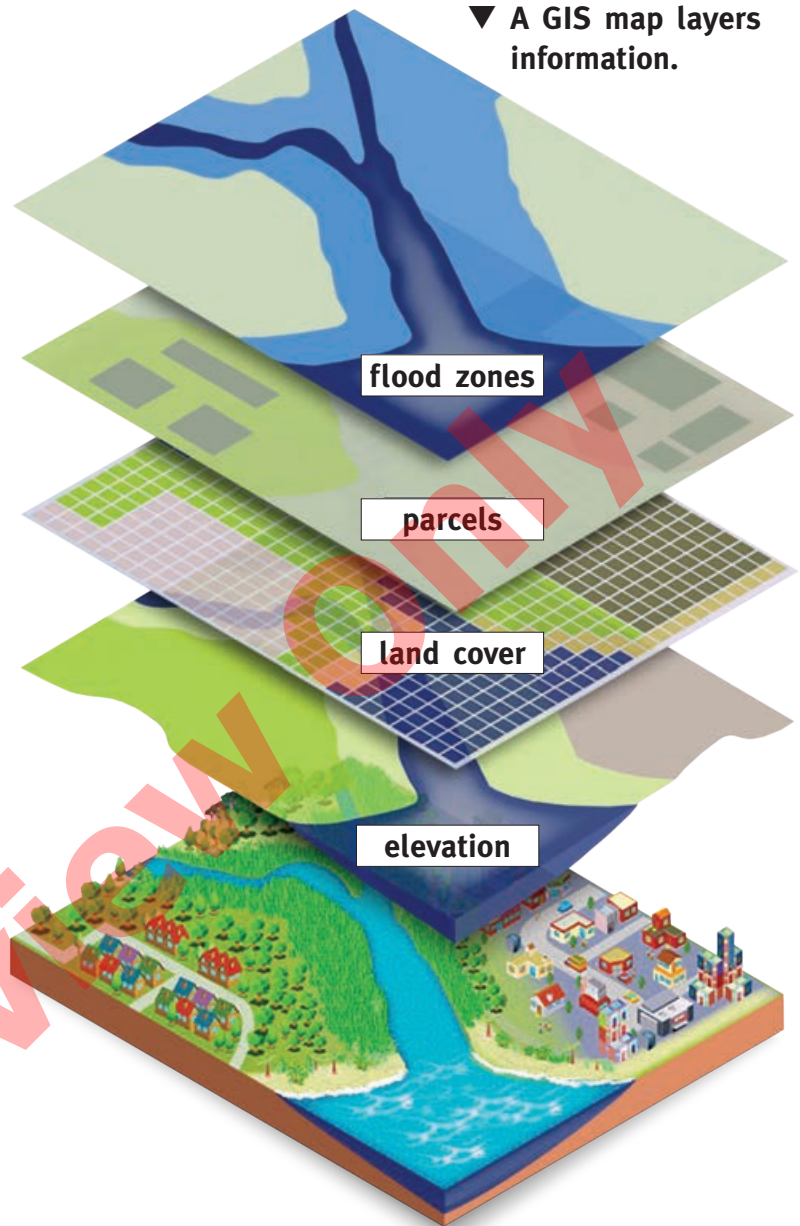
- ▼ This photo of a hurricane was taken by a satellite in space. The satellite uses special technology to find and observe weather patterns and storms.

GIS (geographic information system) is another tool geographers use. GIS computer **software** allows people to create maps and models that show data, or information. The software combines images from satellites with other information, such as the locations of roads, buildings, and landforms. A GIS map can show rivers and streams within a town, as well as areas at risk of flooding. This information can be used to plan for future flooding.

Wood uses GIS software and remote sensing to create maps and models of towns and cities. He then shares the information with others. Wood uses graphs and pictures to show how a community can be affected by a storm or natural hazard.

“I always tell people that they need to show the information in a way others can understand,” says Wood.

▼ A GIS map layers information.



▼ Wood created this map of a village. The yellow, orange, and red areas show how long it would take to walk out of a tsunami hazard zone to safety on roads (dark lines).



Preparing for Disasters

Wood helps residents on U.S. coastlines plan for an **evacuation**, should a tsunami occur.

A tsunami can happen at any time. People may be on a beach when a tsunami occurs. They need to get to safety on higher ground. There also may be a school or a hospital near the beach. It would take time to get everyone to safety. All these people are in danger.

The degree of danger depends on the type of tsunami. A local tsunami occurs close to the coast. People may have only 15 to 20 minutes to get to higher ground. A distant tsunami that starts farther away from the coast gives people a few hours to leave the area.

▼ tsunami evacuation sign



In 2004, a tsunami caused serious damage to the coast of Thailand, a country in Southeast Asia.

