

What Do You Think?

Take a few moments to carefully observe and reflect upon the images below.



Flood



Tsunami



Volcanic Eruption



Earthquake

Discuss with a partner:

- Have you ever experienced what you see in one or more of the pictures? Which ones? Share your experiences.
- Are there any images above that happen often where you live? Which ones?
- Which images would you be afraid to experience? Why?
- What are some differences among the images?
- What are some things that all the images have in common?
- Is there anything that people can do to prevent these events from happening?

Reflect

What are natural processes and natural hazards?

A *natural process* is a process produced by nature. Natural processes can be sudden (such as a volcanic eruption) or gradual (such as the weathering and erosion of a canyon). Sometimes natural processes can be dangerous; these are called *natural hazards*. All the images from the previous page are examples of natural hazards. A natural hazard is a naturally occurring event that may have a negative effect on people or the environment. Some areas are more likely to experience certain hazards than others.

Natural hazards are not always all bad. The Big Island of Hawaii is the largest of the Hawaiian Islands. It is also home to a very active volcano. The Kilauea volcano has been active since 1983. The lava that flows from the Kilauea volcano has added 500 acres of new land to the island. Adding land from cooling lava can be beneficial. It provides more space for plants and animals to live.



Slow-moving lava hardens as it flows across the land and cools.

However, hot, flowing lava from volcanoes can also disrupt the habitat that was already there. It can impact people by destroying roads, houses, businesses, and other structures. It can also hurt or kill people, animals, or plants.

Volcanic Eruption

When natural hazards happen on land, they bring quick, dramatic changes. In 1980, Mount St. Helens erupted in Washington State. The volcano blast was powerful, creating a big crater 2 miles wide. The top of the volcano was actually lost in the eruption.

Volcanoes allow melted rock to reach the surface of Earth. Under Earth's surface, the liquid rock is called *magma*. When magma reaches the surface, it is called *lava*. When lava erupts quickly, it can be dangerous for people and property.

Can you see the differences between the two photographs to the right?



Mount St. Helens before the eruption



Mount St. Helens after the eruption

Natural Hazards: Where do they come from and what can they do?

Natural hazards have natural causes that cannot be prevented. These hazards can become *natural disasters* when people's lives and livelihoods are destroyed. Here are some examples of natural hazards that can become natural disasters.

Earthquakes



Cause — Large pieces of Earth's surface move, collide, and shake.

Effect — People can be injured or killed, and their belongings can be destroyed. Some buildings may collapse from the shaking.

Earthquakes centered near populated areas can cause widespread damage to structures and injury or death to people.

Flooding



Cause — Periods of rapid rain from major storms, snow melting quickly, and rivers overflowing their banks can cause too much water in one place at one time.

Effect — Floods, flash floods, and storm surges can injure people and destroy homes and businesses. People in cars face extreme dangers crossing low areas, where water levels rise suddenly.

Flooding can be destructive and costly in populated areas, damaging property and threatening lives.

Tsunamis



Due to the power and sudden nature of tsunamis, lives are at risk.

Cause — An underwater earthquake, a volcanic eruption, or even a large landslide can set off tsunamis. The energy from these events spreads across the surface of the ocean, and as the very long wave reaches the shore, the wave begins to drag along the bottom of the ocean as it becomes shallower. The wave becomes shorter and **much** taller—as much as 35 meters tall!

Effect — Habitats and landscapes can be completely changed. In populated areas, buildings may be destroyed. Ships in harbors may be washed inland. People, animals, and plants may be injured or killed.

Try Now

Some examples of natural hazards are *earthquakes*, *volcanic eruptions*, *floods*, and *tsunamis*. Read the descriptions below. Write down whether you think each description matches an earthquake, a volcanic eruption, a flood, or a tsunami.

Description	Natural Hazard
A giant wave, 35 meters tall, suddenly crashes ashore, devastating the area before sweeping back out to sea.	
The ground starts shaking. Pictures are falling off the walls. The shaking lasts less than a minute. After it stops, you see cracks in the ground.	
You see a reddish material slowly flowing across the ground. The material gives off steam because it is so hot.	
You hear a loud boom and see ash and chunks of rock raining down from the sky. It is difficult to breathe.	
A severe thunderstorm rains many inches of rain in a short time, causing rivers and streams in an area to overflow their banks.	

Reflect

How can we protect ourselves?

Humans *cannot* eliminate all natural hazards, but we can take action to reduce their impacts. Technology has a role to play in lowering the risks to people and property from natural processes that are hazardous.

Reducing the Impact of Floods

Advanced computer modeling allows scientists to predict where flooding is likely to occur and how severe it will be. The most common protection to prevent flooding is a *flood barrier*. A *floodgate* is a specific type of flood barrier that allows people to control the amount of water that flows through it, reducing flooding.



This type of floodgate is designed to prevent flooding in the protected area behind the barrier.

Reducing the Impact of Earthquakes

Scientists cannot predict when an earthquake is going to happen, but they have developed *earthquake-resistant buildings* to save people and property. These buildings are able to resist the shaking caused by earthquakes. During an earthquake, the collapse of human-made structures during the violent shaking of the ground can result in the greatest losses of both lives and property. The most effective way to reduce the damage of earthquakes is to build earthquake-resistant structures that can handle the strong ground motions. This new technology allows buildings to be a little more flexible, as they sway with motion instead of breaking apart so easily.



Architects can now design and build buildings capable of withstanding intense shaking.

Reducing the Impact of Tsunamis

Scientists are using satellites and buoys to detect the conditions that may cause a tsunami. Researchers are mapping out all coastal areas throughout the world to show which areas are at the highest risk for tsunami damage. People around the world are developing response plans and educating the public about tsunamis and evacuation plans. Warning systems have been designed to alert people if a tsunami is approaching. This gives people some time to move toward safety.



This buoy helps detect seismic activity (such as earthquakes or volcanic eruptions) that can trigger tsunamis. Then it passes that information to warning centers.

Reducing the Impact of Volcanic Eruptions

Because volcanic eruptions are so hard to predict, many instruments are used to detect patterns that might predict when an eruption is coming. Volcanologists (scientists who study volcanos) use seismic tools to measure movement underground (such as little earthquakes). They use other technology to measure air quality and to detect gases that show magma is close to the surface. GPS instruments are used to show whether the ground is deforming due to magma pressure inside a volcano. GPS is used together with satellite images to see if bulges are occurring—such as what happened right before Mount St. Helens erupted in 1980.



Volcanologists use many instruments to measure seismic activity, gases in the air, and changes in landscape. Technology helps them both predict eruptions and warn people to get to safety.

Reducing the Impact of All Natural Hazards

The most important threat of all natural hazards is **danger to human lives**. Because of this, *warning systems* have been developed, using modern technology to keep people informed and to evacuate them if a situation becomes dangerous.