

What makes volcanoes dangerous?

glossary



pyroclastic flow

a cloud of gas, ash, and rock fragments ejected from a volcano



lahar

a destructive mudflow composed of volcanic material and water

What factors make volcanoes dangerous?

Lava is the most obvious danger posed by a volcano. Lava can exceed 1,000°C, and will destroy everything in its path as it flows across the Earth's surface. In addition to lava, volcanoes can eject gas, ash, and rock fragments in a fast-moving cloud called a **pyroclastic flow**. These flows are very dangerous, and can reach speeds of 100 km/h and temperatures of around 700°C.

The force of an erupting volcano can also trigger landslides, dislodging large amounts of rock and soil which then slide rapidly down the slope of the volcano's cone.

Landslides in populated areas can cause catastrophic damage, and when very large landslides reach the ocean, they can cause tsunamis. In 1792, volcanic activity at Unzendake in Japan caused a huge landslide which reached the Ariaka Sea, producing a tsunami that killed 15,000 people.

If the water content of a volcanic landslide is high enough, it can become a **lahar**—a fast-flowing slurry capable of burying entire buildings. In 1985, the eruption of Nevado del Ruiz in Colombia formed four enormous lahars which engulfed the nearby town of Armero, killing over 20,000 people.

Apart from the direct impacts of a volcanic eruption, there are many associated dangers that affect people in the volcano's vicinity. For instance, high-magnitude earthquakes can occur in association with volcanic activity, causing damage to buildings and infrastructure and endangering lives. Substances ejected into the air by volcanoes, such as carbon dioxide, sulfur dioxide, hydrogen chloride, and water vapor, form other compounds that can fall to the Earth as acid rain.

Ash from volcanoes can also be hazardous to aircraft, as seen with the 2010 eruption of Eyjafjallajökull in Iceland. The enormous ash cloud from this eruption caused over 100,000 flights to be canceled over an eight-day period, leaving millions of people stranded around the world.

Active, Dormant, or Extinct?

Volcanoes can be classified as active, dormant or extinct, depending upon how frequently they erupt, and how likely they are to erupt in the future.

- An **active** volcano is one that erupts regularly, or has had at least one eruption in the last 10,000 years.
- A **dormant** volcano is one that has been recorded as active in the past, but has not erupted in recent times.
- An **extinct** volcano is one that has not erupted for around 10,000 years, and is not expected to erupt again.

It may be difficult to determine whether a volcano is extinct, as many volcanoes can remain dormant for a long time. If a volcano is truly extinct, it no longer has a magma supply and it is therefore very unlikely that it will erupt again.

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Why are some volcanoes more dangerous than others?

There are several variables that affect how dangerous a volcano can be. These include viscosity and volume of lava, and the steepness of the volcano's slope. Thick lava is typically more dangerous than runny lava, as it is able to trap and transport a higher volume of debris. However, on a steep-sided volcano, runny lava can become very dangerous, as it will reach high speeds and cover a wide area.

Another variable that affects the danger posed by a volcano is the explosivity of its eruption. When the magma supplying a volcano is thick, the gases within it cannot escape and tend to accumulate. This accumulation of gases causes pressure to build within the volcano, until eventually it escapes in a violent, explosive eruption. Explosive eruptions don't occur with less viscous magma, however, because the gas can escape easily. The sudden release of pressure during an explosive eruption can increase a volcano's power, as with the 1980 eruption of Mount St. Helens in Washington. The increased force of explosive eruptions, along with the pyroclastic flows that typically accompany them, make them extremely dangerous.

Mount St. Helens

In early 1980, magma began to build up below the surface of Mount St. Helens in Washington, forming a bulge on the slope of the volcano. On May 18th, a magnitude-5 earthquake caused the largest landslide ever recorded, which allowed the magma to escape the volcano in a highly explosive eruption. The lateral blast exploded with incredible force, knocking down trees over 30 kilometers away. Over the following nine hours, a super-heated column of gas, ash, and rock fragments rose 24 kilometers into the stratosphere, depositing ash in 11 US states.

The heat of the explosion quickly melted the snow and ice on Mount St. Helens, and the meltwater mixed with the volcanic debris to form lahars. These lahars poured down the mountainside, destroying trees, roads, bridges, and homes. The eruption claimed the lives of 57 people, devastated an area of 600 km², and caused approximately \$1.1 billion worth of damage.