Case Study: What are Volcanoes?

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**Introduction**

A volcano, is a vent through which molten rock and gas escape from a magma or chamber. When a volcano erupts, it discharges molten rock (lava), gases, rock fragments, ash and other volcanic matter onto the land’s surface. The phenomenon of the discharge of the items mentioned above onto the land’s surface is known as ‘Volcanism,’ which has destructive as well as constructive effects.Volcanoes affect people in many ways, some are good, some are not. Some of the bad ways are that houses, buildings, roads, and fields can get covered with ash. If the ashfall is really heavy it can make it impossible to breathe

A volcano is also described as an opening in the earth’s crust through which lava, ash, and gases escape. Volcanic eruptions are driven by pressure from dissolved gas, e.g., much as escaping gases force the cork out of a bottle of champagne. Beneath a volcano, liquid magma containing dissolved gases, rises through cracks in the earth’s crust. As the magma rises, pressure decreases, allowing the gases to form bubbles.

Volcanoes differ in many features such as shape, height, and slope steepness. As you might expect, the shape of a volcano is related to the composition of its magma. Some volcanoes are tall cones and others are just cracks in the ground. How the lava/magma behaves when it reaches the surface depends on both its gas content and chemical compositions. Lavas with low silica contents might have low viscosities and flow freely, allowing any gas bubbles to escape readily, while lavas with high silica contents are more viscous or resistant to flow, so that any trapped gases cannot escape gradually.

**Types of Volcanic Eruptions**.

This depends on various factors such as the chemistry of magma, temperature, viscosity, volume, presence of groundwater, and water and gas content.
Following are the different types of volcanic eruptions:

* **Phreatomagmatic eruption**: This eruption takes place when there is an interaction between the newly formed magma and water.
* **Strombolian and Hawaiian eruption**: Hawaiian eruption has fire fountains while the Strombolian eruption has explosions due to lava fragments.
* **Hydrothermal eruption**: These eruptions include ash and not magma. They are driven by the heat caused by hydrothermal systems.
* **Phreatic eruption:** This is driven when the heat of the magma interacts with the water. These eruptions do not include magma and only ash.

**Types Of Volcanoes**

**Composite Volcanoes:**Composite volcanoes are made of felsic to intermediate rock. The viscosity of the lava means that eruptions at these volcanoes are often explosive. Composite volcanoes are tall, steep cones that produce explosive eruptions

**Shield Volcanoes:**Shield volcanoes get their name from their shape. Although shield volcanoes are not steep, they may be very large. Shield volcanoes are common at spreading centers or intraplate hot spots. Shield volcanoes form very large, gently sloped mounds from effusive eruptions

**Cinder Volcanoes:**Cinder cones are the most common type of volcano. A cinder cone has a cone shape, but is much smaller than a composite volcano. Cinder cones rarely reach 300 meters in height but they have steep sides. Cinder cones grow rapidly, usually from a single eruption cycle. Cinder cones are the smallest volcanoes and result from accumulation of many small fragments of ejected material

**Super Volcanoes:**Super volcano eruptions are extremely rare in Earth history. It’s a good thing because they are unimaginably large. A supervolcano must erupt more than 1,000 cubic km, e.g., the largest supervolcano in North America is beneath Yellowstone National Park in Wyoming. Supervolcano eruptions are devastating but extremely rare in Earth history.

Predictions on Volcanic eruptions

It's impossible to say exactly when, or even if, any given volcano will erupt. Volcanoes don't run on a timeline. headlines say. Volcanoes give some warning of pending eruption, making it vital for scientists to closely monitor any volcanoes near large population centers. [These](https://www.usgs.gov/faqs/how-can-we-tell-when-a-volcano-will-erupt?qt-news_science_products=0#qt-news_science_products) warnings include but not limited to small earthquakes, swelling or bulging of the volcano's sides, and increased emission of gasses from its vents. None of those signs necessarily mean an eruption is imminent, but they can help scientists evaluate the state of the volcano when magma is building.

**Good effects Volcanic Eruptions:**

* + Although steep volcano slopes prevent extensive agriculture, forestry operations on them provide **valuable timber resources**.
	+ Mineral resources, particularly metallic ores are brought to the surface by volcanoes. Sometimes copper and other ores fill the gas bubble cavities. The **famed Kimberlite rock of South Africa, source of diamonds is the pipe of an ancient volcano.**
	+ Volcanism **creates new landforms** like islands, plateaus, volcanic mountains etc. E.g.: Deccan plateau, Mt. Vesuvius.
	+ In the vicinity of active volcanoes, waters in the depth are heated from contact with hot magma giving rise **to springs and geysers.** The heat from the earth’s interior in areas of volcanic activity is used to **generate geothermal electricity.**
	+ Countries producing geothermal power include USA, Russia, Japan, Italy, New Zealand and Mexico.
	+ At many places volcanic landforms attract heavy tourist traffic. At several places national parks have been set up centered around volcanoes.
	+ The **volcanic ash and dust** are very fertile for farms and orchards.
	+ **Volcanic rocks yield very fertile soil** upon weathering and decomposition.
	+ Lava rock is extensively used as a source of crushed rock for concrete aggregate or rail road ballast, and other engineering purposes

**Harmful effects of Volcanic Eruptions**

* + **Health concerns** after a **volcanic** eruption include infectious disease, respiratory illness, burns, injuries from falls, and vehicle accidents related to the slippery, hazy conditions caused by ash.
	+ Further effects are the **deterioration of water quality**, fewer periods of rain, crop damages, and the destruction of vegetation.
	+ In coastal areas, seismic sea waves called tsunamis are an additional danger which are generated by submarine earth faults where volcanism is active.
	+ Volcanism can be a greatly damaging natural disaster. The damage is caused by advancing lava which engulfs whole cities. Habitats and landscapes are destroyed by lava flows.
	+ Showers of cinders and bombs can cause **damage to life.**
	+ Violent earthquakes associated with volcanic activity and mud flows of volcanic ash saturated by heavy rain **can bury nearby places.**
	+ Sometimes ash can precipitate under the influence of rain and completely cover the surrounding regions.

**Conclusion**

Strictly speaking, there are two broad types of volcanoes, a stratovolcano and a shield volcano, although there are lots of different volcanic features that can form from erupted magma e.g., cinder cones or lava domes. Volcanism is a significant geological phenomenon with enormous positive and negative impacts. A volcanic eruption in its wake leads to large-scale destruction of property and loss of life. It takes several years for its effects to subside and for life to go back to normal for the people living near the eruption site.

Moreover, it gives rise to large-scale earthquakes, pyroclastic flows, and many aerosols that are harmful to humans. However, over the years, volcanic eruptions have positively affected the planet by creating new landforms, giving rise to more fertile soils, creating new lakes, etc. Hence, while volcanoes seem extremely destructive at first, in reality, they also have a lot of positive and beneficial effects on the planet.

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