

Volcanic Eruption and its Impact

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Available online at: www.xournals.com

Received 15th November 2017 | Revised 12th February 2018 | Accepted 18th March 2018

Abstract:

In many areas around the world volcanic eruptions in historic times have brought death and destruction to almost half a billion people volcanoes poses a threat today there are approximately 500 active volcanoes on Earth, and every year there are 10 to 40 volcanic eruptions. Volcanic eruption cause a hazardous effects on climate, environment as well as health of the exposed person. The unfavorable effect of volcano depends upon the magma viscosity, distance from volcano and the concentration of gases. According to the data every year an average of 1000 people become the victim of the volcanic eruption. In this people are not only killed by pyroclastic flows, mudflows and ash falls but also from starvation after crop failures because of volcanic eruptions. This paper focuses on volcanic phenomena which provide the understanding of the specific health hazards issues, associated with volcanic phenomena.

KEYWORDS: Volcano, Impacts, Environment, Health Hazard

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Introduction

The name volcano has originate from the roman word Vulcan, a god of fire in Roman mythology. People instantly imagined a scenario of cone shaped mountain with smooth steep slopes, perhaps with a snow covered peak and a ring of smoke rising skyward. The description is accurate but it only applies to startovolcano, which is only a type of volcano. Although the shape and size of volcano are differ in many ways from stratovolcano, some volcanoes are composed of long, gentle slopes often covered with fertile soil while some have no vertical structure instead composed of a depression hundreds of yards deep and extending over several miles. The type of activity carried by volcano is clearly indicated by the shape of volcanic structure.

The relationship between people and volcano is as old as the human race. Volcanic eruptions is one of the most powerful display forces of nature. The volcanic phenomenon is important for society today because of its large eruption impact on climate and society. The eruption from volcanic is sometimes a catastrophically destructive force and greatly influence changes of global environment. Throughout the world every year, about 50 volcanoes are active above sea level, threatening the lives and property of millions of people.

The hazardous effects are produced from volcanic eruption which directly affects the environment, climate, and the health of the exposed persons, and are associated with the deterioration of social and economic conditions. Along with magma and steam (H₂O), the following gases surface in the environment: carbon dioxide (CO₂) and sulphur dioxide (SO₂), carbon monoxide (CO), hydrogen sulphide (H₂S), carbon sulphide (CS), carbon disulfide (CS₂), hydrogen chloride (HCl), hydrogen (H₂), methane (CH₄), hydrogen fluoride (HF), hydrogen bromide (HBr) and various organic compounds, as well as heavy metals (mercury, lead, gold). Ash fallout from large-scale explosive eruptions can cover large areas of Earth and produce aerosol layer which can directly affect the global energy. Volcanic eruptions can produce such features as

floods, pyroclastic flows, and mudflows that can cause major loss of life and property burying towns and villages within minutes. Eruptions can rapidly change productive landscapes to virtual deserts.

Many empirical studies have shown that major eruption can produce a decrease in surface air temperature of up to a few tenths of a degree Celsius over the Northern Hemisphere land masses and that the effects may last for 2 or 3 years. This temperature decrease has been simulated by numerical models using realistic estimates of the nature of the aerosol cloud. The Previous empirical studies of volcanic effects have examined fluctuations in monthly, seasonal or annual climate data, but generally only at a frequency of one observation per year.

Their unfavorable effects depend on the distance from a volcano, on magma viscosity, and on gas concentrations. The hazards closer to the volcano include pyroclastic flows, flows of mud, gases and steam, earthquakes, blasts of air, and tsunamis. Among the hazards in distant areas are the effects of toxic volcanic ashes and problems of the respiratory system, eyes and skin, as well as psychological effects, injuries, transport and communication problems, waste disposal and water supplies issues, collapse of buildings and power outage. Further effects are the deterioration of water quality, fewer periods of rain, crop damages, and the destruction of vegetation.

Geology of volcanoes:

Volcanoes are associated with tectonic plate margins. Most of the volcanoes are recognized as tall cones with summit craters and tend to erupt infrequently but violently. Examples include Mount St Helens (USA), Mount Fuji (Japan), and Pinatubo (Philippines), all belonging to the "Ring of Fire" around the Pacific region. Volcanoes are also found where tectonic plates are separating, for example, in the African Rift Valley. Some volcanoes are not related to tectonic plates and instead to deeper seated convective processes occurring within the Earth's mantle. These so-called "hot spots" are found in both oceanic and continental regions, and include the volcanoes of Hawaii and Yellowstone (USA).

Types of hazards associated with volcanic phenomena:

Type of Hazard	Description	Effects
Acid Rain	Rain becomes acidic when rain falling through volcanic gas and acid particle emissions and may dissolve metal roofs	Irritant to eyes, skin. Secondary effects on vegetation, property and water quality. (Rainwater collected from metal roofs may be contaminated with metals such as lead.)

Ash and Teptra	Ash is a collective term for fine pyroclasts (solid fragments <2 mm diameter, ejected from volcanoes). Tehpra is the collective term for solid fragments such as ash or pumice ejected from volcanoes that have fallen to ground from eruption clouds	Airborne ash respiratory and cardiovascular hazard (asthma, bronchitis, pneumoconiosis). Irritant to eyes and skin. Falling of ash can lead to property damage, contaminate water (e.g. with fluorine carried on ash or by causing turbidity), contaminate or bury agricultural land
Earthquakes	Earthquakes can be associated with volcanic activity	Damage of properties and infrastructure resulting in impact injuries. It may also cause tsunami
Gas and acid particle emissions	Emissions of SO₂, Sulphuric acid aerosol, HCl, HF, CO₂, H₂S, radon and other gases may occur in association with eruptions or through degassing activity. Soil gas emissions of gases such as CO₂, H₂S, and radon are common in many volcanic areas (radon emissions are problematic only in houses with ground gas diffusion where CO₂ forms a carrier gas)	Acid gases: bronchoconstriction, aggravation of respiratory disease; eye and skin irritation CO₂: asphyxiation, secondary effects on vegetation, asphyxiation; low level long term population exposures potentially impacting on respiratory, cardiovascular, and nervous system
Landslides, debris avalanches and lahars	Debris avalanches are fast moving, gravity driven currents of partially or fully water saturated volcanic debris. If the debris flow consists of a significant fraction of clay sized particles it is called a lahar or mudflow. May be triggered by eruptions, gravity, earthquakes, or heavy rain	Drowning, impact injuries. Secondary damage to property and agricultural land
Lava flows	Flows of molten rock. May emit acidic gases. Steam explosions may result from contact with groundwater	Usually relatively slow moving, therefore allowing evacuation. Thermal injuries. May cause forest and property fires. Methane explosions can occur as lava moves over vegetation
Tsunami	Tidal wave from volcanic debris avalanches into oceans or lakes or occasionally volcanogenic earthquakes	Drowning and injuries from property damage

Previous studies suggested that 490 volcanic events in the 20th century resulted in human impacts, with 4–6 million people evacuated, made homeless, or otherwise affected. Fatalities occurred in around half of the events, with an estimated total of 80 000–100 000 deaths. In future the risk of catastrophic human losses is much larger than witnessed in the historic period, the increase in human population, and proximity of major cities worldwide to active volcanoes, including Naples and the capitals of Mexico, Japan, the Philippines, Ecuador, Guatemala, and El Salvador.

Conclusion

Volcanic eruptions have a devastating effect on people and the environment. Strong explosive volcanic

eruptions are known to have a pronounced impact on the climate and it is important to understand about the volcanoes, structure of volcanoes, types of volcanoes in order to reduce the negative impact of volcano eruptions and take advantage of its benefits on people and environment. Major mortality associated with volcanogenic phenomena recorded in history has resulted from pyroclastic density currents (avalanches of hot ash, gases, and rocks), tsunami, landslides, and debris flows which directly affects the environment, climate as well as the health of the person. An increasingly multidisciplinary approach is being adopted in research into health hazards of volcanoes and improving management of health risks



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