

**HAZARDS: MINIMIZING RISK AND MAXIMIZING  
AWARENESSS**

by

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## **Introduction**

Hazards are the dangers arising from geological or weather-related occurrences such as earthquakes, volcanoes, floods, hurricanes and tornadoes. The most familiar and publicized are those that take place without warning, often of catastrophic dimension. In addition, there are continuous hazards whose effects are less apparent, such as radioactivity or natural occurring toxic metals in the environment, while other natural hazards can be accelerated by human activities such as flooding resulting from the destruction of forest.

## **Causes of hazards**

These hazards occur because of various geological processes such as Plate tectonic movements and human activities that pollute the atmosphere. Volcanoes and earthquakes occur near the tectonic boundaries where the oceanic crust is subsiding or plunging beneath, the continental crust e.g. Pacific oceanic crust that is subsiding beneath the west coast of North and South America continents. However, floods are due to both human activities like poor agriculture practices on the river valleys or heavy rains in semi-arid areas while, hurricanes, and tornadoes are due to both human activities that affect the atmospheric conditions such as excessive emission of carbon dioxides (which cause global warming) and other natural climatic changes.

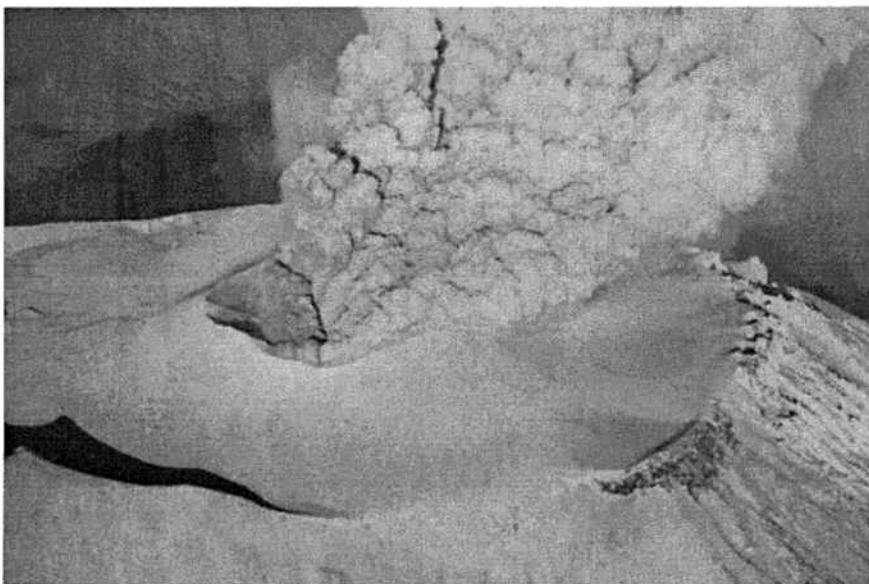
## **Effects of Volcanic Hazards in Tanzania**

These hazards cause many destructions and even loss of lives to human beings, animals and plants, as a result the world become neither safer nor wealthier place for human beings to live. This essay covers the cases of seismic activities that result to the eruption of volcanoes in Rungwe Volcanic Province (RVP) and Oldonyo Lengai in Mbeya and Manyara regions respectively in Tanzania (East Africa).

Rungwe volcanic province lies at the triple junction of the East African Rift System in southwest Tanzania. This volcanic province consists of basalts, trachytes, tuffs and volcanic ash erupted along vents that are controlled by basement structures (Marobhe, 2006). The last eruption in Rungwe volcanic province took place in 1800AD at Kiejo area. Recently, there have been many indicators to show the

possibility of a near future eruption. In December 2000-January 2001, there was an earthquake, which took place in this province and it had a tremendous effect to local residents who live around the area. Houses in the Suma village were severely destroyed leaving hundreds of people homeless. Suma primary school trashed down and it had to be closed, withholding hundreds of children without primary education for a while.

Similarly, Oldonyo Lengai Mountain, which is 3450m above the sea level, is an active volcano on the southern shore of Lake Natron in North East of Tanzania. It has experience tremors measuring 6 in Richter scale from June to September this year with after shocks reaching Kenya. Last year volcanic eruptions from the same mountain leads to displacement of 3000 villagers, and eruption in this year has emitted ashes, which contaminates water, pastures, and cause this area to be unsafe for both human beings and livestock (Figure 1).



*Fig 1: A photograph by L. Dudley taken in October 2007 of the Oldonyo Lengai Mountain showing the grayish smoke of ashes from the top of the mountain.*

In addition to earthquakes, there are wide spread gas emanations (i.e. carbondioxide) in Kiejo and Shuwaga (Figure2), which has

caused deaths of natives as well as animals who passes nearby especially during the night and morning since the rate of photosynthesis, is low (Figure3). Numerous amount of Fluorine is also emitted into the water sources and its effects have been visible to the villagers living around Ngozi and Masoko Crater Lakes in the RVP where the colour of teeth changes to brown. There is also a possibility of bone weakening and fluorosis diseases due to high concentration of fluoride in both surface and groundwater resources. There is elevated concentration of trace elements in the hot and cold springs around the RVP that can pose serious health risk to the population residing in the area. For example, the concentration of arsenic, which is a highly toxic metal, varies between 98 and 168 ppb, which is 10-17 times more than the WHO recommended guideline for the portable water.



*Fig 2: Photography showing gas (Carbondioxide) bubbles emanating from the base of a stream at Shuwaga area.*



*Fig.3 Photograph of a rat, which died after inhaling a harmful gas~(carbondioxide) at Shuwaga gas stream, Rungwe volcanic Province.*

Despite of the risks associated with Volcanic Hazards, the richness of the Land attracts people. Fertile soil rich in iron and other nutrients needed by plants are attracting millions of people in rice growing areas in Rungwe district. The fertility of the soil also support growing maize, beans, potatoes and tea plantations making Rungwe one of the best supplier of food in Tanzania.

Geothermal energy projects going on in Rungwe area will lead to population growth in this volcanic province thus exposure to volcanic risks and hazards is obvious. This is because in some of the places, Rungwe being a real example water seep down through cracks and fissures in the crust and become heated to high temperatures when reaching the hot rocks. If these temperatures exceed 350C, hence these reservoirs (place where they are collected) can provide powerful source of energy.

In addition to geothermal energy, there is a possibility of eco-tourism industry to grow fast in this area. For example Lake Masoko and Ngozi located in Rungwe volcanic province, which are the crater lakes, has been a potential asset for the eco-tourism. Not only that, but hot springs and beaches (Matema beach) covered by volcanic sediments (ashes and pumice) also play a big role as tourist sites.

Similarly, Oldonyo Lengai Mountain is one of the tourist areas; contribute substantially to the income of the local people, live near by, and in the nation's GDP. Though important for tourists, these areas are too risk to reach for example Lake Ngozi has a very steep cliff wall of about 150-300m from top to the surface of water. To reach the lake one requires support from tree roots and rope.

However, this area can be useful for scientific studies and researches to deduce various environmental parameters of interest e.g. through studying the lake sediments, scientists can discern past climates and climatic changes across the province (palaeoclimate).

### **Recommendations**

Local authorities, private institutions and government ought to take effective and sustainable measures prior to these hazards to prevent the loss of lives and properties of their citizens living in these areas. Most lava flows advance slowly and even the fastest of them move slowly enough so that it is possible to warn people in their paths in time for them to get out of their way (MacDonald, G.A. 1972). Measures like installing warning systems including a live-cam at the top of the volcano to inform the residents when volcano is up to erupt. Also providing education to the primary and secondary schools, and residents about the effect of earthquake and volcano, associated risks to health, economy and life in general, and coping mechanisms so that they can be willing to shift to other safer areas.

### **Conclusion**

Through these measures, we can make our Planet Earth to be safer, healthier and wealthier place to live and enjoy life.

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## **MOTIVATION STATEMENT:**

I am a student full of potential and energy, ready to take big challenges with confidence and excellence, capable of causing positive changes in this world through my personal and professional initiatives. Due to these personal qualities, I decided to enter this IYPE Student contest and write on hazards in order to create awareness to the general public, as there are numerous events taking place throughout the Planet Earth that makes it to be unsafe and unhealthy place to live.

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