

Living in the shadow of Italy's volcanoes

Throughout Etna's history, nearby towns and cities have been threatened by ash falls, lava flows and earthquakes. Figure 1 shows a house destroyed by a recent lava flow on the flanks of the volcano. Roads, agricultural land and tourist facilities are regularly affected by eruptions and ash clouds can disrupt air travel.

Figure 1

House destroyed by eruption on the flanks of Mount Etna (1992)



Image source: http://en.wikipedia.org/wiki/Mount_Etna#mediaviewer/File:EtnaHaus.JPG

Examples of damaging eruptions

Catania, 1669

The regional capital Catania (Figure 2) has itself been damaged on several occasions. In 1669 half the city was destroyed by a lava flow. The city has also been periodically affected by ash clouds that blow over the city causing pollution and transport disruption, particularly affecting the international airport.

The volcanic hazards of Mount Etna

Figure 2

Map of the Mount Etna area



Approximate Scale: 10km \longleftrightarrow

Image source: <http://www.snow-forecast.com/resorts/Mount-Etna>

Mascalì, 1928

In 1928, the village of Mascalì (Figure 2) was destroyed in only two days when a fissure opened up near the foot of the mountain. At the time the population of the village was about 10,000. Many people's homes were destroyed by the lava flow (Figure 3).

With help from the military, there was an orderly evacuation of the town's inhabitants and families were able to remove furniture and fittings from their houses. Evacuees were relocated to nearby towns staying with relatives, friends or in hired apartments.

By 1937 a completely new town had been built on a grid-iron plan. Housing conditions were very advanced in comparison with other towns in the region. In terms of hazard and risk assessment the 1928 eruption demonstrates that lava can reach the lower flanks of the volcano within a short time period after the onset of an eruption.

The volcanic hazards of Mount Etna

Figure 3

Mascali, destroyed by a lava flow in 1928



Image source: <http://www.delcampe.net/page/item/id.55641249.var.WM14-ITALIE-ITALIA-SICILIA-1928-MASCALI-EN-SICILE-PREMIERE-PHASE-DE-LA-DESTRUCTION-D-UNE-VILLE-DE-10000-HABITANTS.language,E.html>

Zafferana Etnea, 1992

In 1992 the town of Zafferana Etnea (Figure 2) was threatened by a lava flow. Huge earth barriers were constructed up to 400m in length and 20m high in an attempt to protect the town. Additionally, attempts were made to block lava tunnels (Figure 4) to starve the lava flows. The US Marines also used helicopters to drop concrete blocks into the lava flow to try to slow it down.

However, when the embankments were overtopped by the lava after about a month, explosive experts constructed a diversion canal and blasted a hole in the lava wall to divert the lava away from the town (Figure 5). Whilst this succeeded, the flow of lava from the eruption ceased and the town survived.

Over the centuries, the town has been damaged by lava flows but it has always been rebuilt. The most recent eruption to affect the town occurred in 2013. Ash falls followed by heavy rain caused disruption and led to a lengthy clean-up operation.

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Figure 4

Concrete blocks used to attempt to block a lava tunnel threatening the town of Zafferana Etnea (1992).



Image source: <http://bigthink.com/eruptions/why-would-you-ever-bomb-a-volcano>

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Figure 5

Sketch of diversion works at Zafferana Etnea (1992).

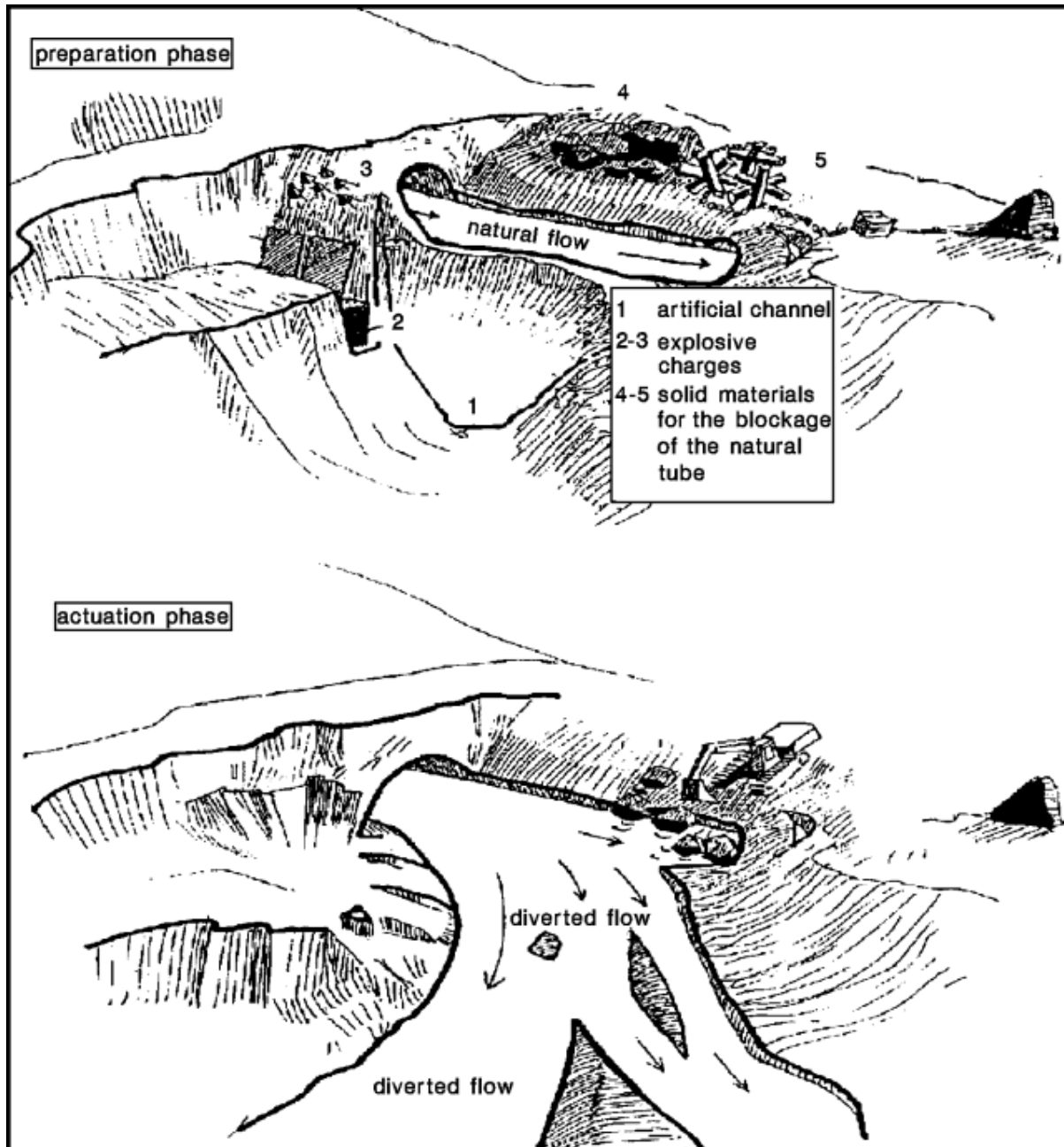


Image source: <http://www.volcano.si.edu/volcanoes/region01/italy/etna/01etn54f.png>

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Questions

1. View silent archive footage showing the destruction of Mascali in 1928 at <https://www.youtube.com/watch?v=JP4GmTjoG6U> .
 - a) Describe the lava flow, its size, nature and speed of flow.
 - b) Describe the damage done to the buildings and the town's infrastructure.
 - c) Assess the risks to the people shown in the video.
2. Use the internet to find out what the town looks like now.
3. There is an excellent video showing the lava flow on the outskirts of Zafferana Etnea at <https://www.youtube.com/watch?v=QV5QbD6wS3o>.
 - (a) Describe the characteristics of the lava flow.
 - (b) Assess the threat of the lava flow to people, property and infrastructure.
4. With reference to Figures 4 and 5, describe and explain the engineering responses to the threats posed by lava flows to the town of Zafferana Etnea.
5. Conduct further research on the responses to the 1992 eruption by accessing <http://www.volcano.si.edu/showreport.cfm?doi=10.5479/si.GVP.BGVN199207-211060> .