



Lucien Canton is a nationally recognized expert on strategic planning for crisis and disasters. A popular speaker and lecturer, he is the author of the best-selling *Emergency Management: Concepts and Strategies for Effective Programs* used as a textbook in many higher education courses.

Prior to starting his own practice, Mr. Canton served as the Director of Emergency Services for San Francisco and as an Emergency Management Programs Specialist and Chief of the Hazard Mitigation Branch for FEMA Region IX.

Lucien G. Canton, CEM (LLC), is a management consulting firm specializing in helping managers lead better in crisis.

Lucien G. Canton, CEM (LLC)
783 45th Ave
San Francisco, CA 94121
415.221.2562
415.520.5218 FAX
LCanton@LucienCanton.com
www.LucienCanton.com

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The Laki Eruption of 1783

A case study in cascading disasters

There's an old saying that, "all disasters are local." There is some truth to this on a certain level but believing it does tend to narrow our view of the impact of disasters. We become complacent about disasters in remote locations and believe they have nothing to do with us.

All disasters have ripple effects. For example, the 1906 earthquake and fires in San Francisco led to a currency shortage in Los Angeles and contributed to instability in the stock market in New York that led to the Panic of 1907. These ripple effects can in turn create new ripples leading to a series of cascading events that can be worse than the original disaster. In extreme cases, they can alter the course of history.

The Triggering Event

We are used to thinking of volcanic eruptions as a single big event. This was certainly the case with the eruption of Mount Vesuvius in 79 CE or the explosion of Krakatoa in 1883. But some eruptions are less dramatic and deadlier. This was the case with the eruption of the volcanic fissure Laki in the south of Iceland in 1783.

Beginning in June 1783, the eruption of Laki and its adjoining volcano Grimsvötn lasted eight months, until

February 1784. The explosions and lava flows from 140 vents along 14 miles of fissures and cones discharged an estimated 42 billion tons of basalt lava and pumped 120 million tons hydrofluoric acid and sulfur dioxide into the atmosphere, about 80 times that of Mount St. Helens.

The impact on Iceland was devastating. Most of the crops were destroyed as the soil became poisoned. Over 50% of the livestock died, primarily sheep (80%) and cattle (50%). The combination of fluoride poisoning and starvation from the resulting famine led to the deaths of 20 to 25% of the population, roughly 10,000 people.

The Disaster Spreads

The immediate impact on Iceland was horrific but it was just the beginning. Ninety-five million tons of sulfur dioxide were forced to higher altitudes where an unusual high-pressure ridge forced it south-east towards Europe. A thick haze formed, so thick in places that vessels were unable to navigate and were confined to ports. By the end of June, the haze covered all of Europe as far East as the Adriatic Sea. By July it had crossed Russia and Siberia and entered China. Within a few more weeks it had crossed to Egypt and Syria.

The haze was anything but benign. When sulfur dioxide combines with the moisture in lungs or clouds, it creates sulfuric acid. In England alone, some 23,000 people are estimated to have died as a result. The haze lingered until the autumn.

Meteorological Disaster

The toxic haze was not the only problem. Temperatures began to rise, producing severe thunderstorms. With the storms came hailstones so large that they were reported to have killed cattle. The high temperatures were followed by a severe winter that was said to have resulted in another 8,000 deaths in England.

The effects of the Laki eruption on weather in Europe was to continue for several years, producing cool and rainy summers that led to reduce crop yields. While the Laki eruption was not the only source of climatological instability, the resultant crop failures caused by this instability created the conditions that sparked the French Revolution 1789.

Nor were the effects of the Laki eruption confined to Europe. Evidence suggests that the light-scattering effect of the large quantities of dust and sulfur dioxide in the atmosphere affected monsoon patterns in India and Africa. The result was decreased precipitation in the Sahel region of Africa, reducing the level of the Nile River in Egypt by 20%. The reduced flows led to famine. One report stated that by January 1785, almost one sixth of the Egyptian population had died.

Between 1783-1786, Japan suffered from three consecutive years of famine brought on by the failure of the rice harvest due to extreme cold weather. Over 1 million people were reported to have died as a result.

In China and India, the story was the same. Temperatures dropped, rainfall decreased, and the countries experienced severe drought leading to famine.

The United States Not Immune

The effects of the Laki eruption were worldwide and even reached the United States. The winter of 1784 saw temperatures in the eastern United States fall to almost 41° F below average temperatures. The harbor in Charleston SC froze enough for people to ice skate. Chesapeake Bay also froze over, as did the St, Lawrence River. Ice floes were reported on the Mississippi River and in the Gulf of Mexico. The river froze at New Orleans and a major snowstorm engulfed the South. It was one of the longest and coldest winters on record.

Aftermath

In all, the ash cloud from the Laki eruption covered almost a quarter of the earth's surface, affecting all the northern hemisphere above the 30° latitude. Estimates put the worldwide death toll attributed to the disaster at some six million people but there is no way to know for certain how many died.

And yet, the Laki eruption was not a truly catastrophic event. The weather effects lasted for less than twenty years. There are historical events of much greater consequence, such as the eruption at Lake Toba some 70,000 years ago that almost ended life on our planet.

But the Laki eruption provides an example of how a seemingly small event occurring thousands of miles away can have cascading effects that circle the globe and bring death to millions. It is a reminder that while "all disasters are local," we need to be aware of what is happening in the rest of the world. 