

Natural disasters of the past can help solve future problems

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When the Icelandic volcano Eyjafjallajökull erupted in 2010, the ash cloud brought air traffic in northern Europe to its knees and cost society an absolute fortune. Changes in climate and the environment will grow more expensive in future, but there are unexploited and cheaper resources available in local communities, says Felix Riede, an associate professor of prehistoric archaeology. Credit: Árni Friðriksson

Were you one of the many people who got stuck in an airport when the Icelandic volcano Eyjafjallajökull erupted in 2010? It wasn't a major eruption, and it happened a long way from the heart of Europe. But it cost society an absolute fortune by paralysing air traffic across northern Europe.

According to Felix Riede, an associate professor of prehistoric archaeology at Aarhus University and the project manager of the Laboratory for Past Disaster Science, global warming and the increasing frequency of natural disasters constitute a huge challenge to modern society, which has a heavy infrastructure and increasing population density. Until now the solutions have involved expensive state intervention and technology-aided approaches, but Riede believes that the past contains a wealth of unexploited resources which could also provide solutions.

"The problem facing research into natural disasters is that they are so infrequent that it's hard to get statistically significant samples and draw up any general rules about how such events influence society. But if we extend the scope of our chronological perspective to include the deep past, we can find far more samples and data material to study."

Mixing the past and present to produce future scenarios

Felix Riede currently has a manuscript being reviewed by the journal *Natural Hazards*, in which he outlines ways of using data from the past to predict future scenarios. He uses a novel comparative approach.

"Unlike much of the research done previously, which studies either individual events or many different societies and events, I propose a more formalised method known as 'natural experiments of history'. As in

laboratory experiments, you try to keep your parameters identical so you can spot the influence of each individual parameter on the outcome of your experiment. We measure purely geological parameters, but we also measure vital factors such as economic, technological, religious and social parameters as well," explains Riede.

Three of the specific examples that he has compared are the volcanic eruption in Iceland in 2010, a volcanic eruption that took place in Central America around the year AD 536 (which also affected European society at the time), and a [volcanic eruption](#) 13,000 years ago near Lake Laach in Western Germany. The idea involves using the events of the past to produce a model of potential future events both in Europe and around the world.

"Combining data from the three eruptions enables us to develop a variety of scenarios. The Icelandic case shows us how much damage a relatively small eruption a long way from the heart of Europe can cause. What would happen if there was a new eruption in Central Europe like the Lake Laach incident? What would the consequences be for modern society? The Lake Laach volcano is still active, and it's right next to the Rhine, which plays a major role in the European economy. The region is also densely populated, and there are lots of nuclear power stations on both the French and German sides of the river. I doubt whether they are built to cope with this kind of worst-case scenario. There's only a small risk of Lake Laach erupting again, but the Icelandic eruption clearly revealed how fragile the system is in principle."

Don't ignore the strength of local communities

Felix Riede regards knowledge of past [natural disasters](#) as an unexploited but sustainable resource. He also thinks that human resources in local communities are important. In his article for "*Natural Hazards*", he explains his ideas about how Europe can create more resilient

communities – which means communities that can resist external events.

"So far my research indicates that the most resilient communities are well-connected communities with a strong local base. In my view resilience in Europe should be strengthened at the lowest possible level. In other words, local communities should be strengthened by allocating responsibility to citizens and giving key individuals the right competences and knowledge. Priests, doctors and teachers could be involved, for instance – they're in touch with a lot of people and have access further up the system. Some of the measures that could be implemented to strengthen [local communities](#) and local resilience are relatively cheap – but the potential rewards are relatively large."

Provided by Aarhus University

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