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Sir David King: Just suppose it was us…

Don't be complacent, warns the Government's Chief Scientific Adviser. A tsunami could also happen in the Atlantic, and Britain would be dangerously unprepared

We take nature for granted, and when we don't, we think we know how to keep it at bay. When the rain falls, we can be pretty sure our houses will be safe. When the wind blows, we're still confident that our cheap flight to the sunshine will take off. When it snows, with the help of a shovel or at worst a snow plough, we can be pretty sure that life will go on unimpeded. At worst, or maybe at best, we might have to have a day off work.

So when an earthquake off the west coast of Sumatra causes countless deaths and devastation, it takes us a good while to take in its full awfulness. All our assumptions about our impregnability are challenged. Suddenly we are reminded of our vulnerability and frailty. And for me, the question is, what are the roles that scientists can best play to assist survivors, and, learning from this event, reduce risks from future catastrophes?

Indonesia is well known to be a volcanically active region. As long ago as 1815, the eruption of Mount Tambora, situated between Timor and Java, devastated the local population. Since it was well above sea level it did not produce a major tsunami, but the expelled pulverised rock and ash are now believed to have caused the disastrous "year without a summer" along the north-western United States in 1816. Krakatoa, a small island between Java and Sumatra, blew in 1883, leaving an undersea crater, creating pyroclastic flows and tsunamis, claiming 36,000 lives. The arc that extends from the Mediterranean to Iran, Indonesia and the western Pacific is one of the most prone to these tectonic catastrophes. Here, the Indo-Australian plate is in collision with the Eurasian plate, pushing up the Himalayas on the one hand and, sliding beneath the Eurasian plate, causing earthquakes and subduction volcanoes along the Indonesian island chain on the other,

Seismologists and vulcanologists have now developed a remarkably clear understanding of these processes. They can identify areas that are predisposed to some sort of volcanic activity, but they still struggle to develop theories and methodologies to enable them to predict specific quakes. Until they can, scientists will continue to seek ways of reducing risk to survivors, of designing earthquake-proof buildings and infrastructure, and of preventing the event or mitigating its impacts. While the science of prediction may still be in its early stages, that is no excuse for us to be unprepared when the first sign of identifiable volcanic activity is evident. A vast wave created by an undersea earthquake at least offers a small time lag before the damage is done on land, and we need to be confident that we have the capacity to react quickly to eruptions and forewarn vulnerable populations.

In the Pacific, as we were reminded last week, early warning communication cascade systems were brought into operation following earthquakes in Chile in 1960 and in Alaska in 1964, and this has markedly reduced the number of deaths as a result of tsunamis. The procedure is not complicated. It doesn't need to be. Emergency managers are deputed to pass word to coastal communities to move inland and climb to a certain height above sea level. Similarly in Bangladesh, the impact of cyclones has been reduced simply by government employees on bicycles blowing whistles to send people to shelters. What is important is that there is a system.

In the case of the Sumatran earthquake, though, there was no system. Geophysicists did pick up the signals from the quake and rapidly locate it, determine its magnitude and estimate its impacts, but those who made frantic attempts to communicate with authorities achieved little. And nobody can pretend that the world was well prepared for what happened last weekend when those responsible for monitoring volcanic activity in the Pacific - who had picked up the rumblings from the Indian Ocean - could excuse themselves so blithely. One told Radio 4 that it was "not my job" to pass on word of what he had picked up, incredulous that anyone should think it might have been. It probably wasn't his job, but it should have been someone's. Reports that an Indian Ocean system are to be developed are obviously welcome.

But what of the situation closer to home? A few years ago, Steven Ward at Santa Cruz and Simon Day at University College London did some calculations about the giant tsunamis that would be generated by the collapse into the Atlantic of one of the Canary Islands. Cumbre Vieja is a mass of rock off the coast of La Palma island and is waiting to collapse. Ward and Day showed that tsunamis caused by this would overwhelm the Canary Islands and batter the coasts of Africa, Europe and the Americas. Britain would have a six-hour warning before a 30ft wave hit us. New York would have nine hours.

How likely is this event? And when is it likely to occur? Activity on Cumbre Vieja in 1949 caused movement of the west flank of the volcanoes, a rock mass estimated to be twice the size of the Isle of Man. It is deemed likely that it will eventually collapse at any time in the next 10,000 years. The question of whether we should take action to pre-empt something which may not happen for several millennia is a difficult challenge for risk analysts, but one British geophysicist, Bill McGuire, is calling for an early-warning system for the North Atlantic, and after what we have seen in the Indian Ocean, I would endorse that. It may be verging on the distasteful to raise the possibility of such a shocking event happening here, as if the awful events we have seen were somehow not enough. But surely now, when public consciousness of this issue is at its height, is the time to raise the question.

As far as the wider world is concerned, setting out a full range of low-probability, high-impact catastrophic events, and faced with a finite budget, how can humanity most usefully act to reduce risks to human populations? With the rapid expansion of the human population, from three billion to six billion over the past 50 years, as each year passes the number of people at risk increases. I believe that in the aftermath of this disaster an intergovernmental panel of geophysical scientists should develop a global foresight programme to co-ordinate scientific knowledge and research programmes in the area of tectonic catastrophes, and to make recommendations for action. Along the lines of the Intergovernmental Panel on Climate Change, the work of this panel should be ongoing and wide-ranging, stretching from relatively low-tech early-warning systems to recommendations for government investment in further research to develop methods of reliably forecasting quake and volcanic activity.

The co-ordination of relief work following such a disaster to reduce further casualties from disease through lack of medical supplies, clean water, food and shelter needs to be organised separately, but must be co-ordinated with the early-warning systems. Hilary Benn, our Secretary of State for International Development, is highly critical of the work in this area of the UN Office for Co-ordination of Humanitarian Affairs, and plans to raise the whole issue at a meeting with Kofi Annan in New York in February. By mining the remarkable understanding of the earth system developed by geophysical scientists around the world, we need to move towards an effective global system of surveillance and response to minimise the risks to populations from these terrestrial catastrophes which are beyond our control.